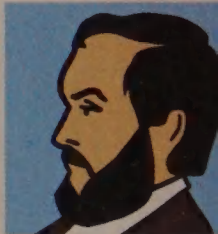
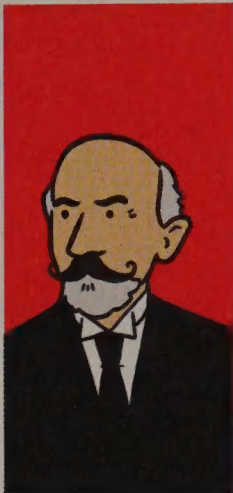


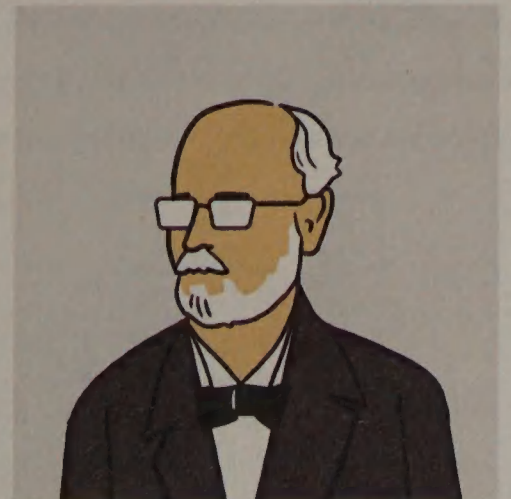
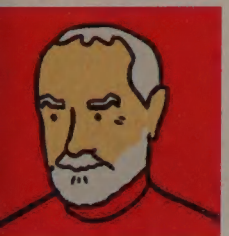
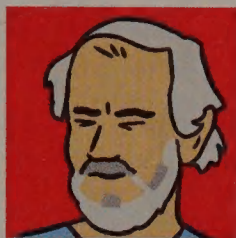
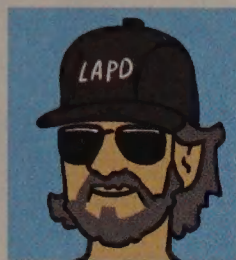
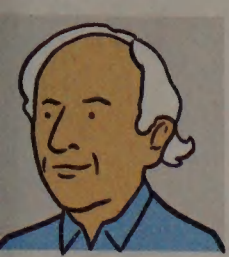
ADAM ALLSUCH BOARDMAN

AN ILLUSTRATED HISTORY OF FILMMAKING



NOBROW





For my folks and siblings, and the exceptional
people at Nobrow that helped make this book.

But not for those who talk loudly at the cinema.

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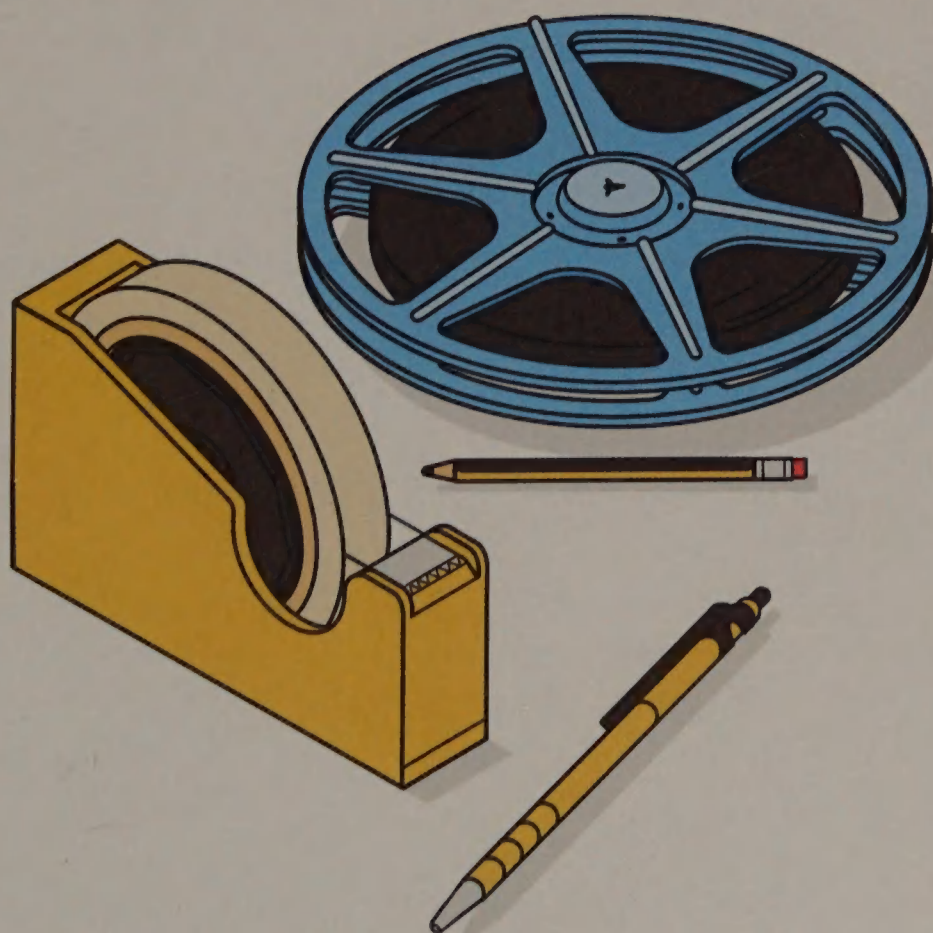
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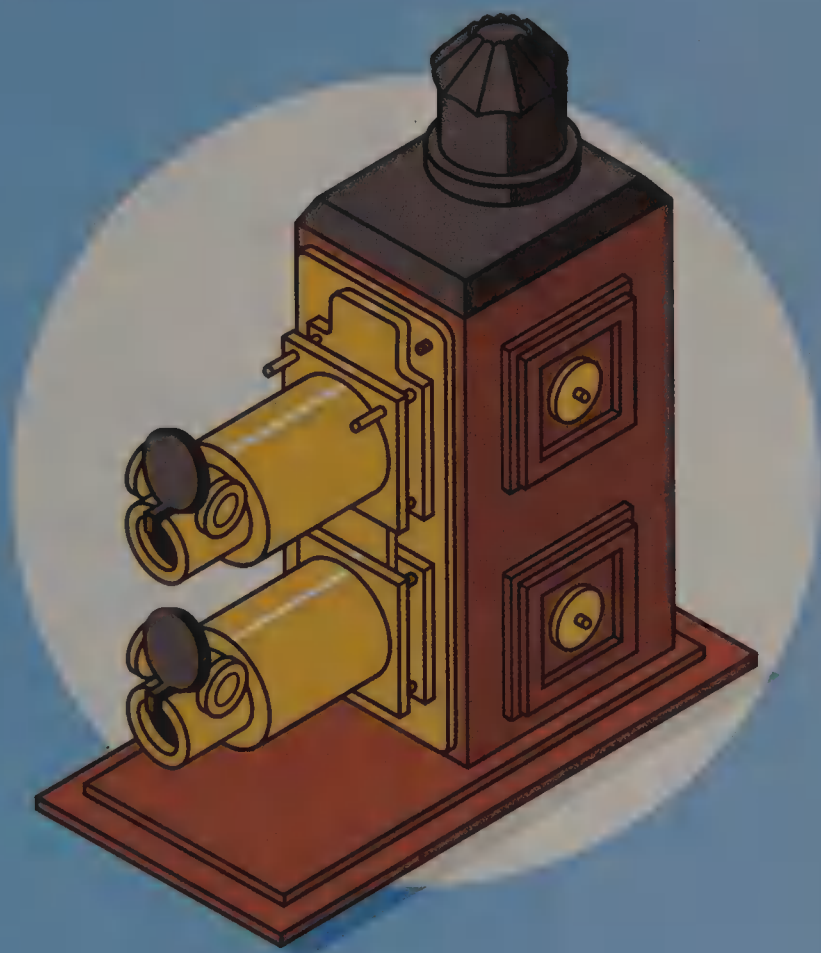


INTRODUCTION

Most of us have some memory of the first time we went to the cinema. In my case, it was the special edition re-release of *The Empire Strikes Back* (1997), and as it was my birthday I was allowed into the projection room. Seeing those huge projectors that made motion pictures possible was an incredible experience. Since that moment, I have been fascinated with filmmaking equipment and how it all works.

With this book I will do my best to explore some of the devices, methods and people that have shaped filmmaking through history, from aspirational foundations to commercial empires. You may notice that I don't discuss the history of animation, as I really think that is deserving of its own book and not just a tacked-on chapter or two. It's my hope that you'll be intrigued enough by this book to go and make your own forays into this fascinating field.

PREHISTORY



PLAYING WITH LIGHT

Moving images are a surprisingly ancient form of entertainment. Interacting with light can be traced to the prehistoric discovery of fire, but it was in ancient East Asia that light was first used to show narrative scenes.

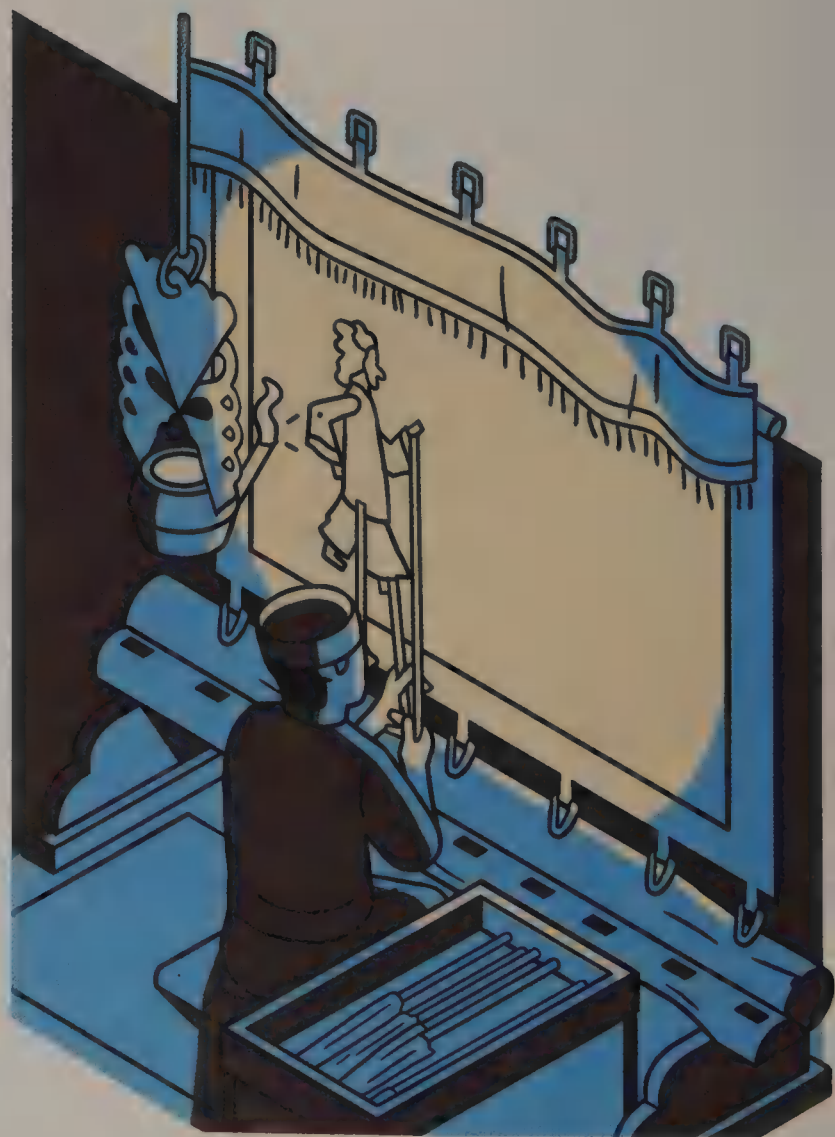


A Bronze Age person enjoying the splendid light and warmth of fire.

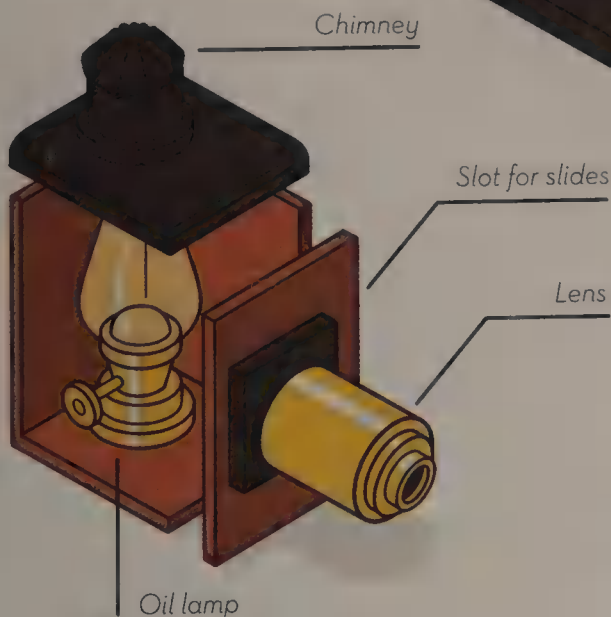
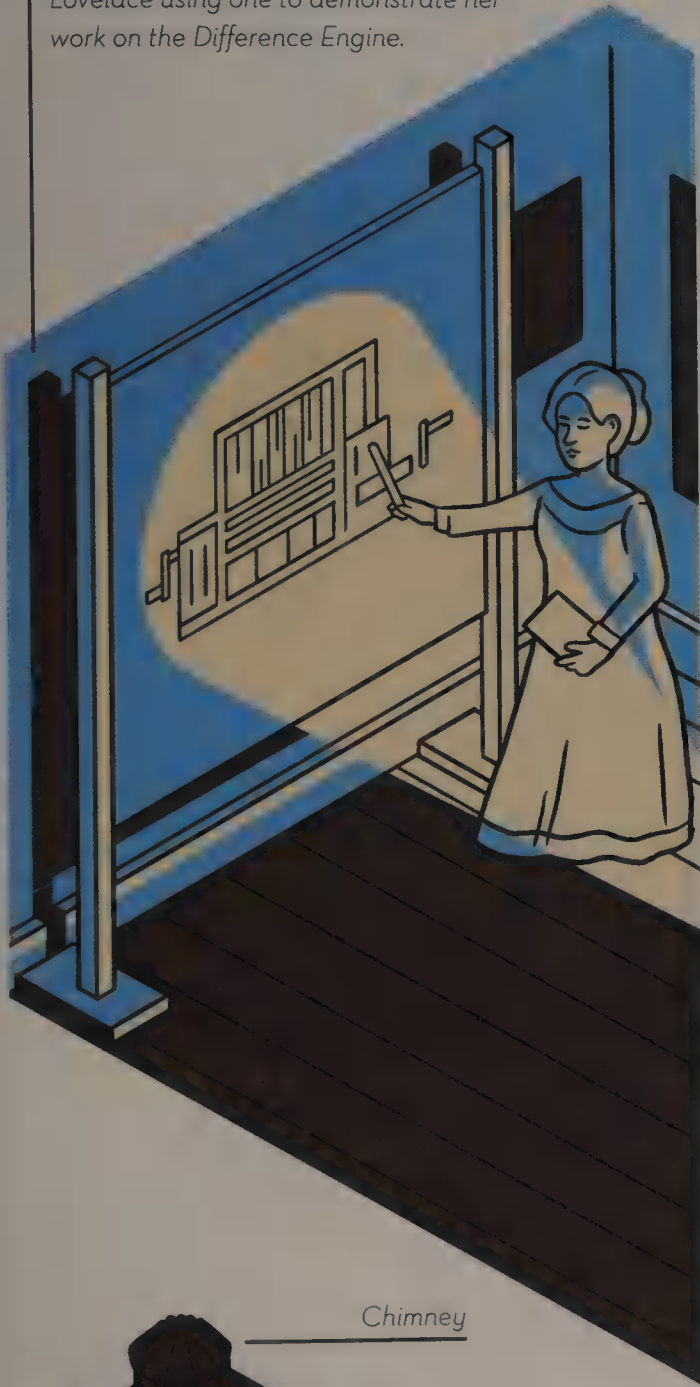


Oil lamps were often ornately decorated.

In these shadow plays, puppets were held between a screen and a light source to create the shadows of characters. To this day, there is still a tradition of shadow play in Indonesia, Thailand and Malaysia.

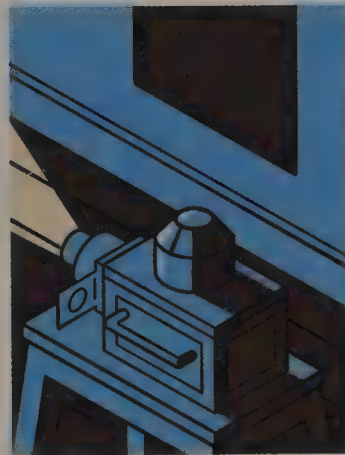


Magic lanterns were commonly used by academics. Here I've imagined Ada Lovelace using one to demonstrate her work on the Difference Engine.



Old Devices

The optical phenomenon of the camera obscura is likely just as ancient. When the sun shone through holes in animal hides or caves, our ancestors may have discovered that this produced an inverted projection. During the 17th century, there was a fresh interest in optics that led to the invention of the telescope and microscope, and in 1659 Dutch mathematician and astronomer Christiaan Huygens created a working "magic lantern", what we now might call a projector.



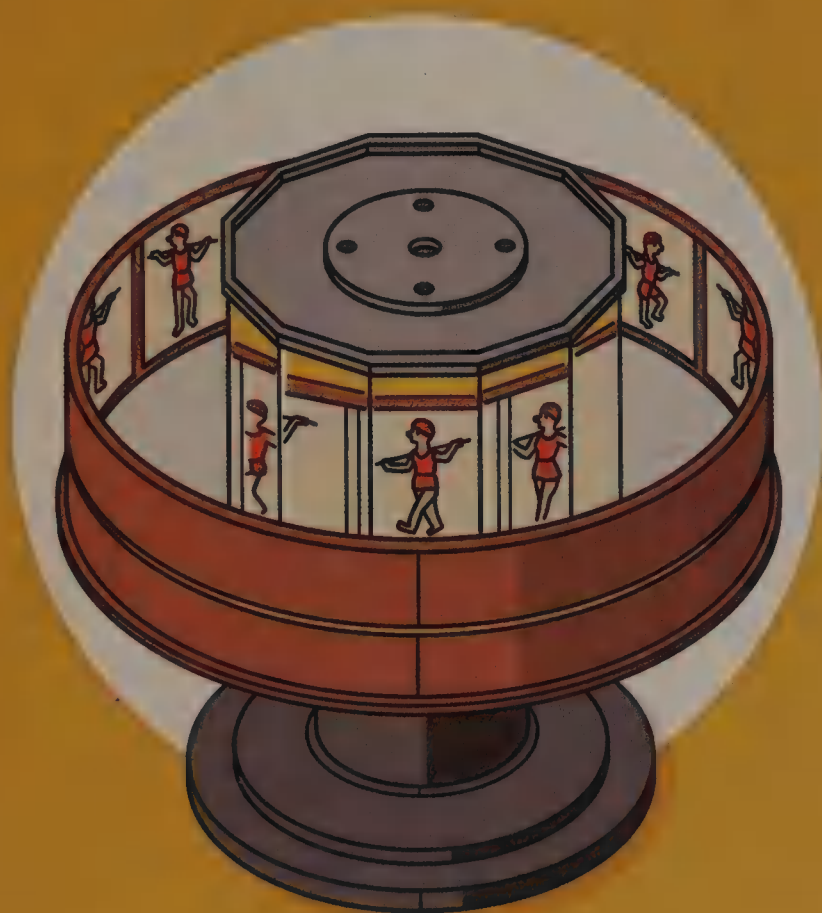
CHRISTIAAN
HUYGENS

This device involved a lens, a light source and a painted glass slide. Lanterns could be used as tools for teaching and storytelling, and the operators could quickly change slides to create the illusion of movement.



A slide depicting a floating airship.

19TH CENTURY



THE 1800s

The Industrial Revolution ushered in a great era of scientific discovery. Trailblazing explorers and tyrannical empires connected the world, allowing information and technology to be shared more quickly than ever.

ZOETROPE



Among the new devices created at this time was the Zoetrope, a revolving drum with a sequence of images on the inside. When the drum is spun at high speed, the brain processes the images as continuous movement.

Film

The word 'film' refers to capturing images on photosensitive stock, a process that was developed in a frenzy of scientific experimentation. The French inventor Nicéphore Niépce had some early success; his *View from the Window at Le Gras* (1827) is the oldest surviving photograph. After continued experimenting, the end of the century brought the development of photosensitive celluloid 'film', from which all photography derived until the digital age.



NICÉPHORE NIÉPCE



The first photograph (1827).

The Study of Motion

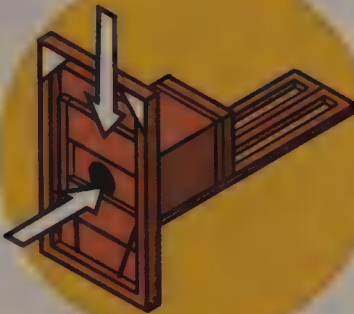
The English scientist Eadweard Muybridge used an impressive volley of cameras to establish whether horses lift all of their hooves from the ground mid-gallop (they do). His investigations improved camera shutter speed and led to faster emulsions.



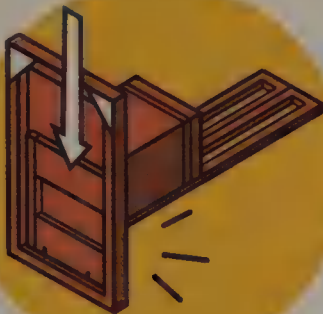
EADWEARD
MUYBRIDGE



1. Camera in start position.



2. Shutter mechanically triggered by trip wire.



3. The shutter in closed finish position.



A horse galloping by a volley of cameras.



In 1879, Muybridge used his Zoopraxiscope invention to create the illusion of movement with captured sequential images. The device was elegant in its simplicity. Muybridge traced his photographs onto a glass disc, which was then spun in front of a light source to create an animated projection.

THE FIRST FILMMAKERS

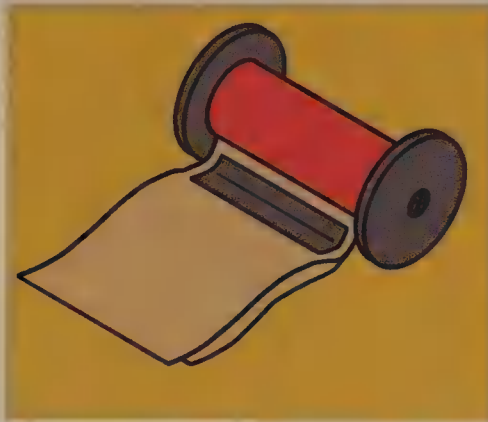
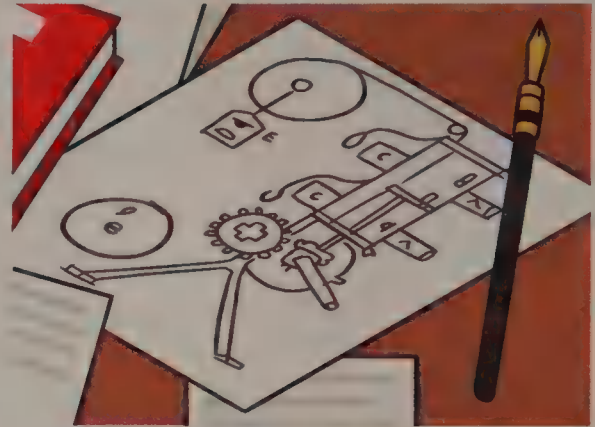
The French engineer Louis Le Prince is the father of motion pictures. The earliest surviving film in existence is his *Roundhay Garden Scene* (1888), with a length of 2.11 seconds.



LOUIS LE PRINCE



Roundhay Garden Scene (1888)



Kodak film (1880s),
similar to what Louis used.



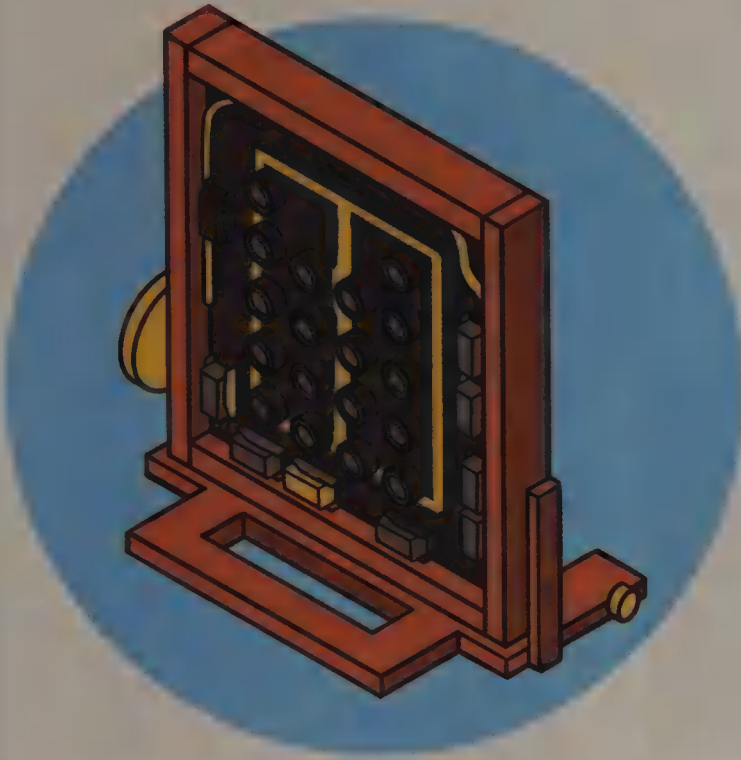
60mm film spool for single-lens camera.



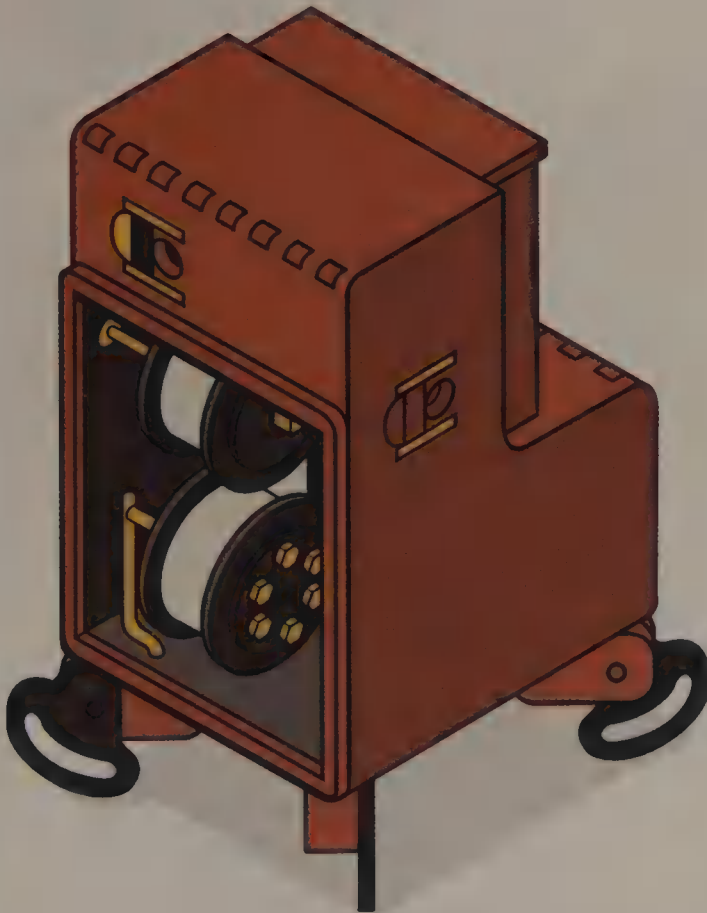
On his way to a promotional tour, Le Prince boarded a train in Dijon; but when it arrived in Paris, his awaiting friends found that he had disappeared. Le Prince was never seen again, prompting a mass of wild theories, including a murderous conspiracy engineered by rival inventor Thomas Edison.

Le Prince's Cameras

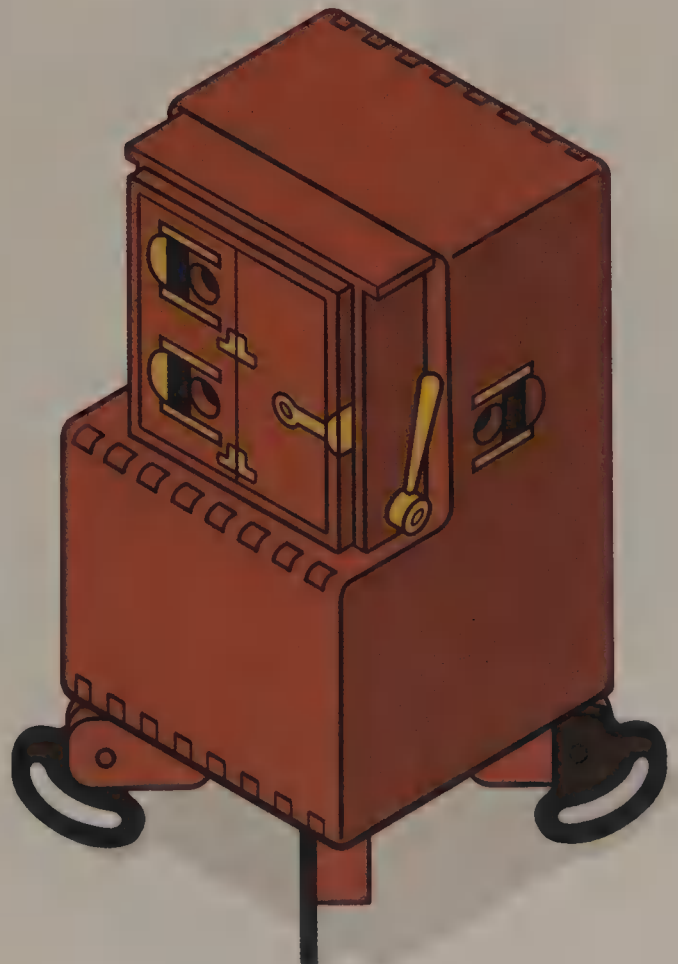
The *Roundhay Garden Scene* was shot using Le Prince's single-lens camera, which seems the most conventional to our modern minds. However, Le Prince also developed cameras with multiple lenses, including a sixteen-lens camera. Le Prince's cameras could be configured to each project; he referred to these modified devices as 'deliverers'.



Sixteen-lens camera-projector (1886)



Single-lens camera-projector Mk2 (back) (1888)



Single-lens camera-projector Mk2 (front) (1888)

THE 1890s

In the 1890s, the public was enthralled with the unprecedented spectacle of motion pictures. For the first time, fleeting records of life could be repeatedly viewed and shared.

The Kiss (1896)



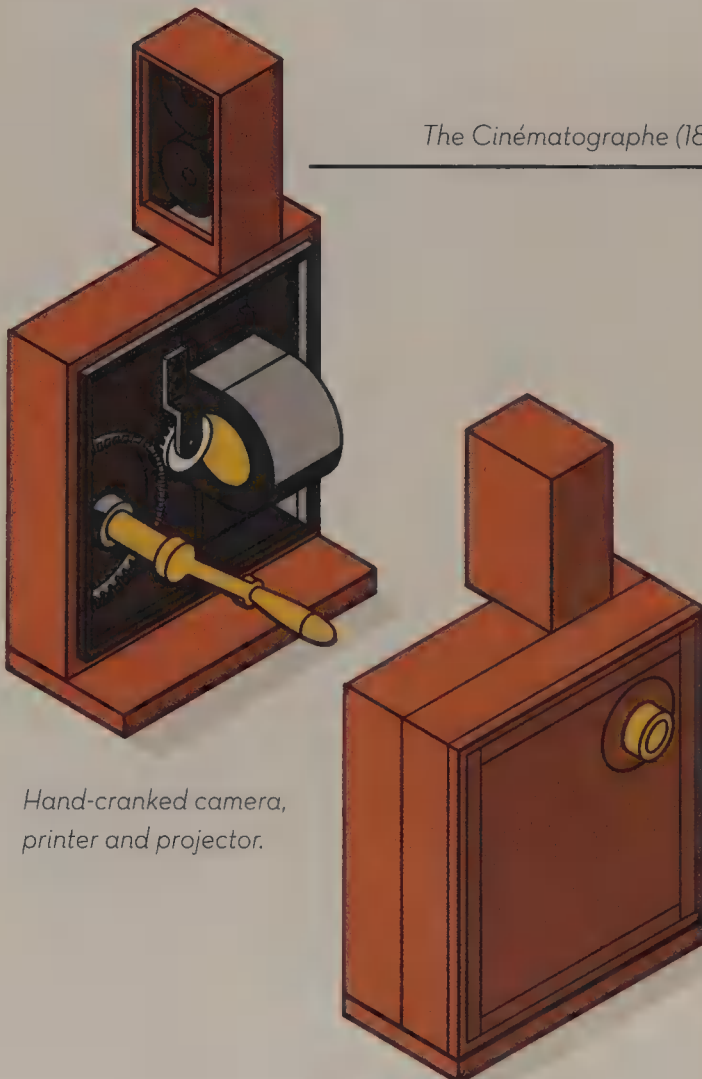
A chap enjoying 'The Kiss'.

Many were shocked by the raw obscenity, prompting condemnation by the Catholic church.



Edison's
Kinetoscope
(1893)

The Cinématographe (1895)



Hand-cranked camera,
printer and projector.

Equipment Paradigms

Around this time, the infamously competitive inventor Thomas Edison introduced the Kinetoscope, inspired by Muybridge's Zoopraxiscope. The device permitted a viewer to look through a tiny peephole and see a moving image, which was created by a strip of film moving over a light source. Meanwhile, the French inventor Léon Bouly developed the Cinématographe (from which we take the word 'cinematography') and sold the patent to the Lumière brothers. The Cinématographe could be configured to capture footage and project images, allowing for public screenings.

The First Film Studios

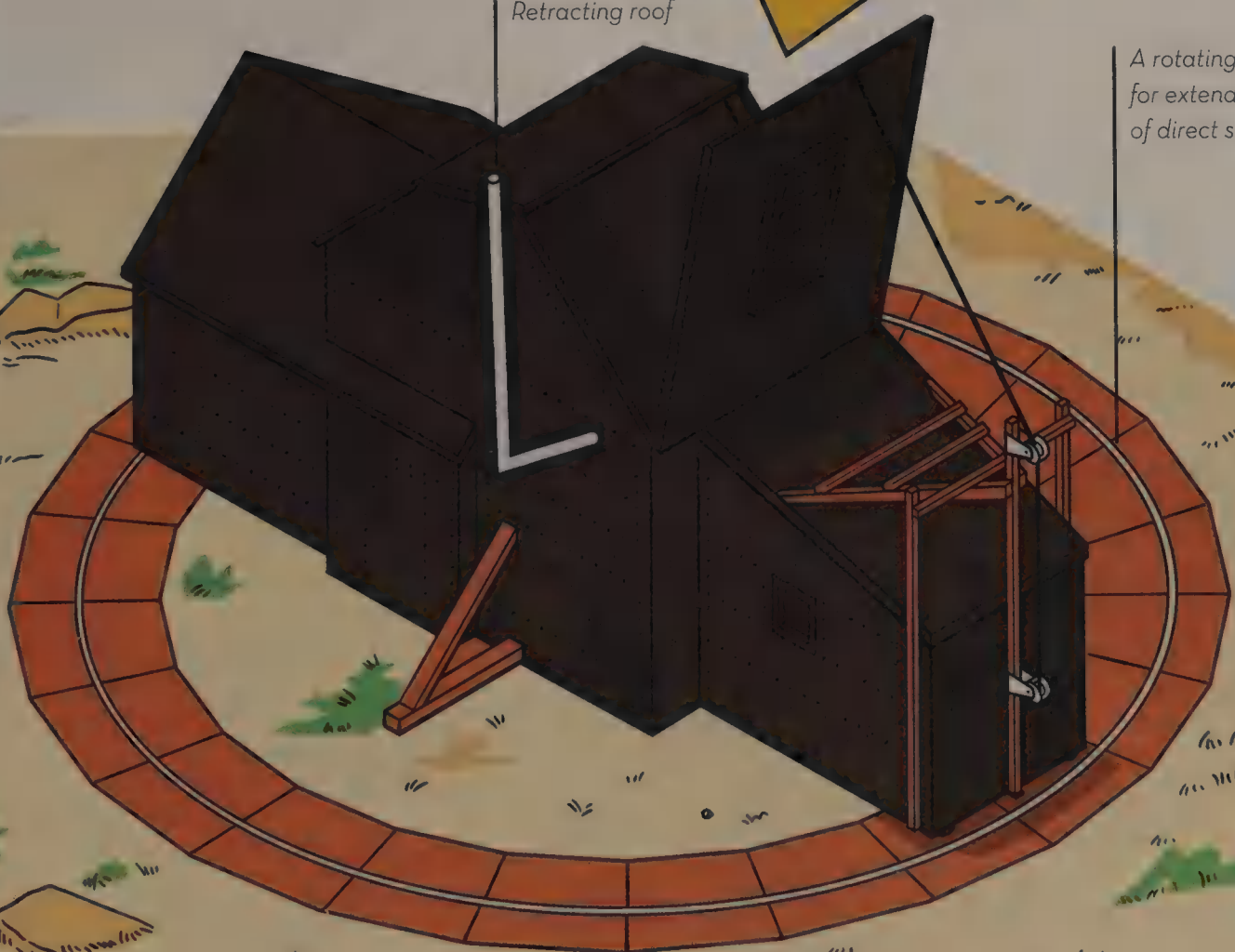
Most early filmmakers relied on natural lighting. Edison's Black Maria, built in 1893, was the very first production studio and was reliant on sunlight. The studio stood on a rotating platform, which turned to let sunlight in for longer periods of time. A few years later, the German inventor Oskar Messter opened the first film studio in Berlin. Messter's experience in theatre lighting gave him the foresight to install four Korting & Matthiessen 50-amp arc lamps, so filming was no longer limited to daylight hours.

THOMAS EDISON

(exhibiting his frown)



Retracting roof



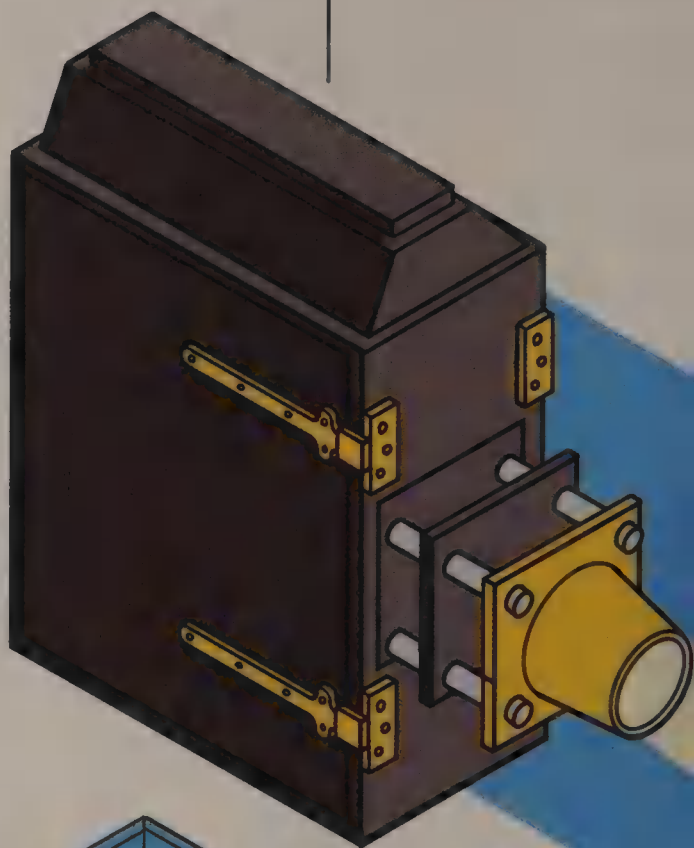
A rotating platform for extending hours of direct sunlight.

The Black Maria (1893)

THE FIRST SCREENINGS

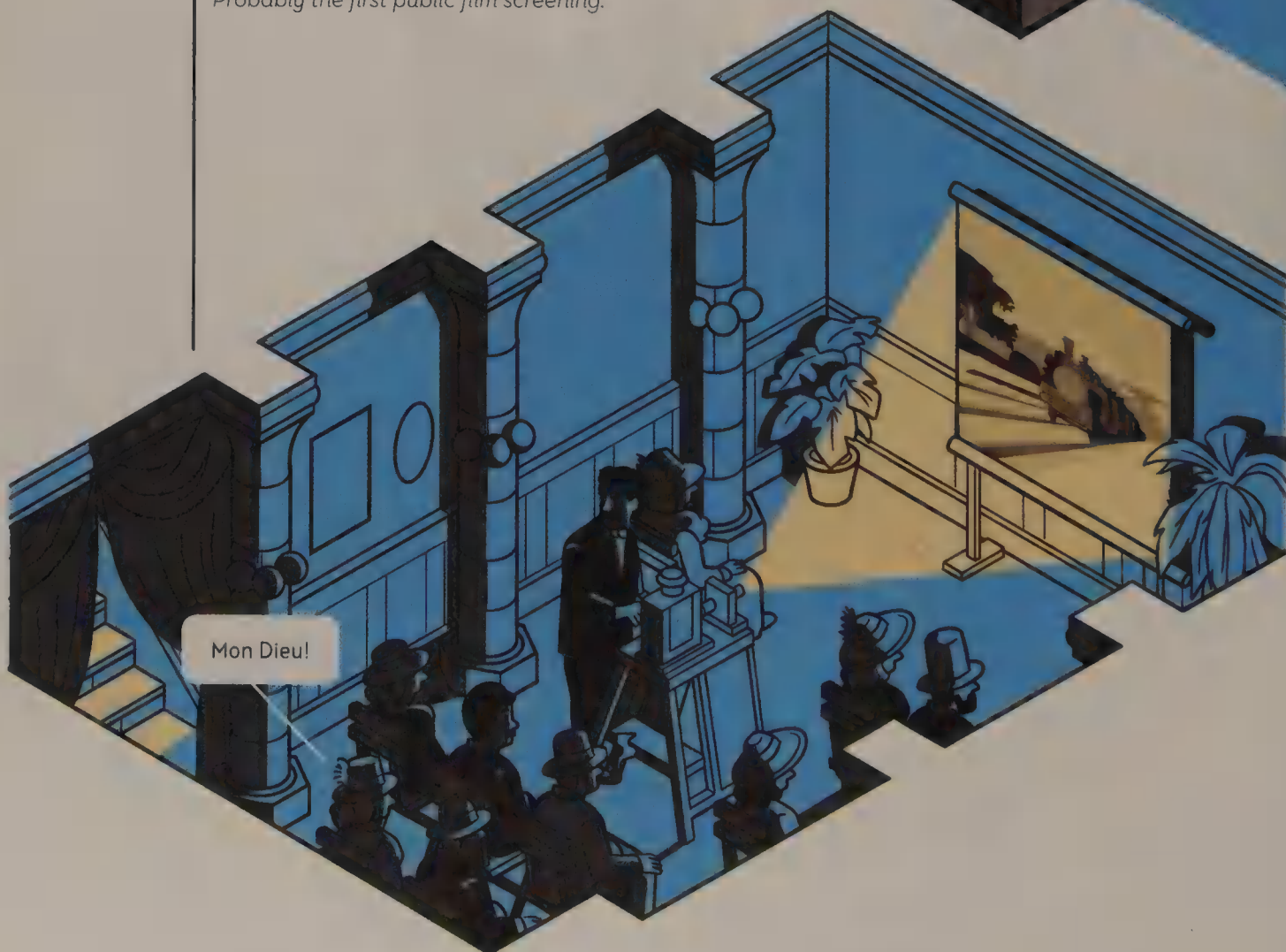
The Lumières were probably the first to publicly project films in as early as 1895 at Le Salon Indien du Grand Café in the centre of Paris. The first time audiences saw *Arrival of a Train at La Ciotat Station* (1895), they were startled as the train seemingly thundered straight towards them. Strangely, the Lumières were not convinced of the potential of their machine, and would later abandon screenings in favour of other scientific enterprises.

The Cinématographe configured to project.



Le Salon Indien du Grand Café

Probably the first public film screening.



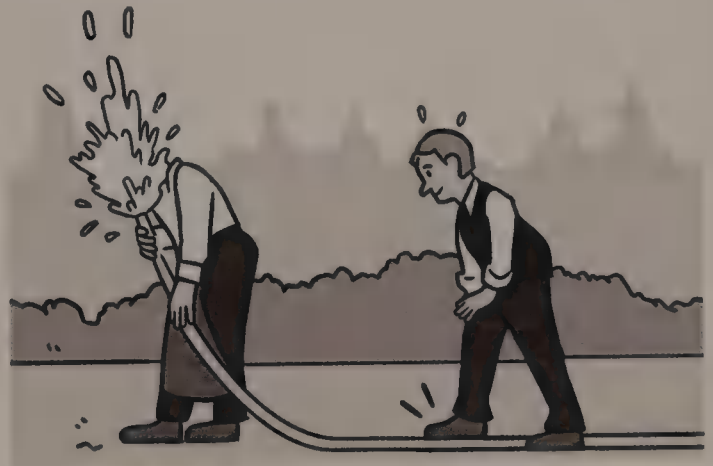
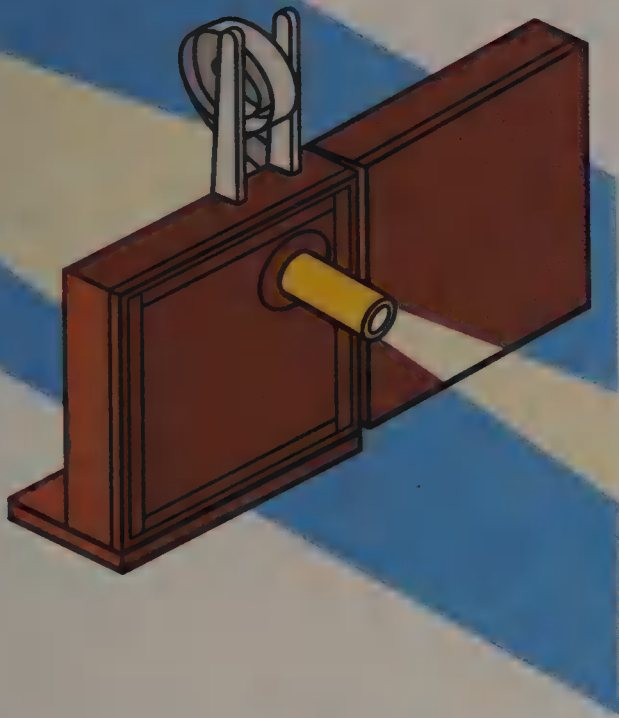


AUGUSTE LUMIÈRE

The Lumières' films were mostly candid depictions of everyday life, which they referred to as 'actualités'. They also made a handful of slapstick comedy films.



Arrival of a Train at Ciotat Station (1895)



The Sprinkler Sprinkled (1895)



LOUIS LUMIÈRE



Baby's Meal (1895)

20th

CENTURY

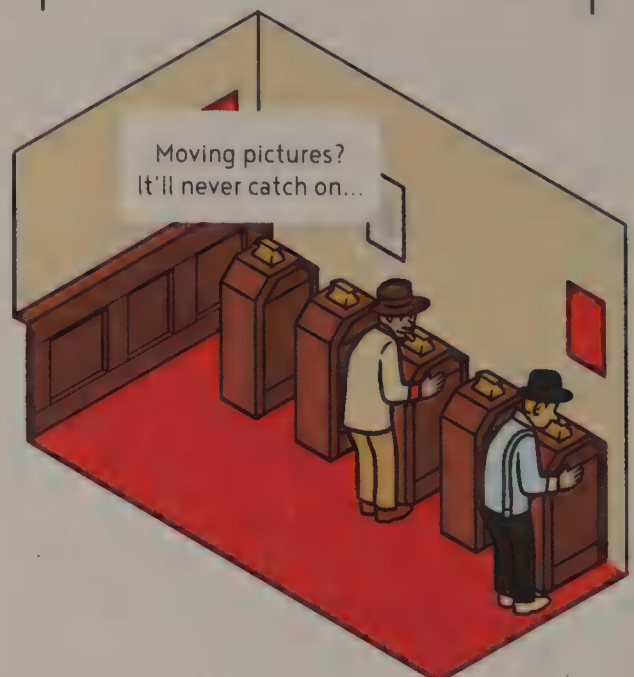
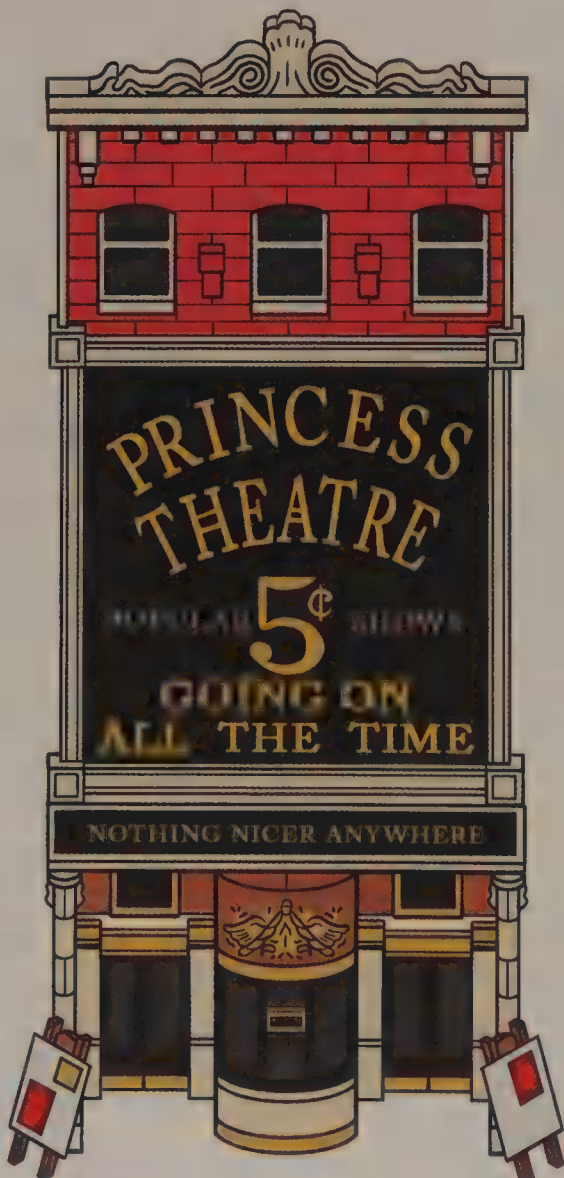


THE 1900s

Motion pictures were sold worldwide, as were devices like the Kinetoscope and Cinématographe. As these motion pictures lacked sound, translation was not an issue.

Vaudeville and Nickelodeons

Vaudeville houses were home to great variety shows, showcasing anyone from actors to acrobats. Judy Garland and Cary Grant would begin their careers as performers or 'vaudevillians' at these venues. Some vaudeville owners installed projection equipment, allowing short films to be played as part of the programme.



A row of kinetoscopes.

A screening at a vaudeville.
Smoking was very common.



Vaudeville and nickelodeons were often frowned upon by high society types; in their twilight years they were seen as amoral and seedy.

The first purpose-built venues for viewing motion pictures were nickelodeons. The name comes from 'nickel', referring to the coin-operated machines inside (usually Kinetoscopes), and 'odeon', a modified Greek word meaning something like 'roofed theatre'. The majority of early short films exhibited were gags and soft pornography.

MAGIC AND ILLUSION

The Frenchman Georges Méliès was a versatile artist and magician who pioneered techniques such as the dissolve, superimposition, and time-lapse. His experience in set and costume design gave his films an imaginative style. His screenings were often part of a broader performance of magic tricks and mechanical puppetry.



GEORGES MÉLIÈS



JEHANNE D'ALCY

D'Alcy was one of the very first full-time actors.



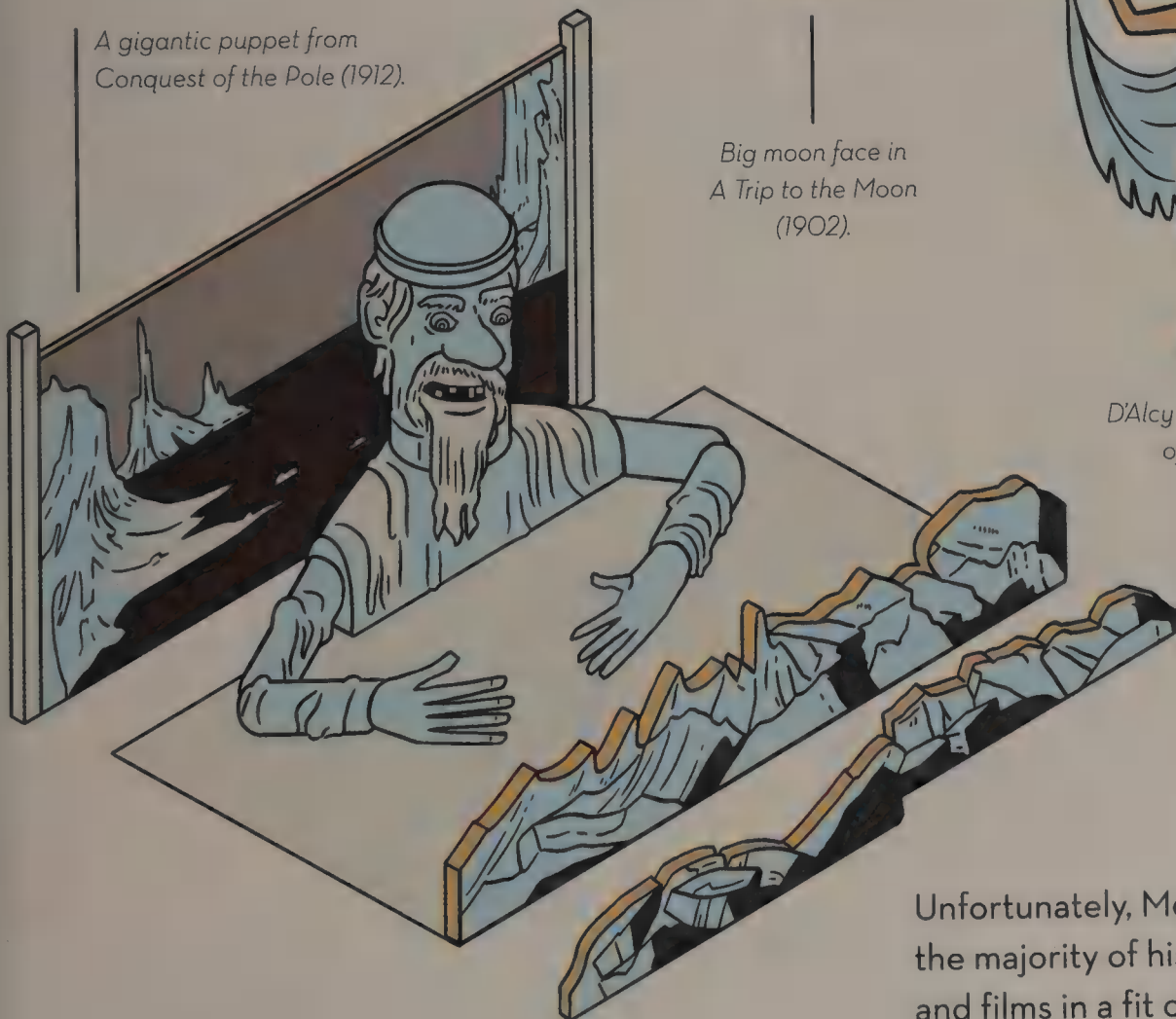
During the First World War, the studio was appropriated as a hospital and film stock was recycled into shoe heels.



Méliès as Mephisto in
The Damnation of Faust (1818).



A gigantic puppet from
Conquest of the Pole (1912).



Big moon face in
A Trip to the Moon
(1902).



D'Alcy in *The Damnation*
of Faust (1818).

Unfortunately, Méliès burned the majority of his sets, costumes and films in a fit of despair.

THE 1910s

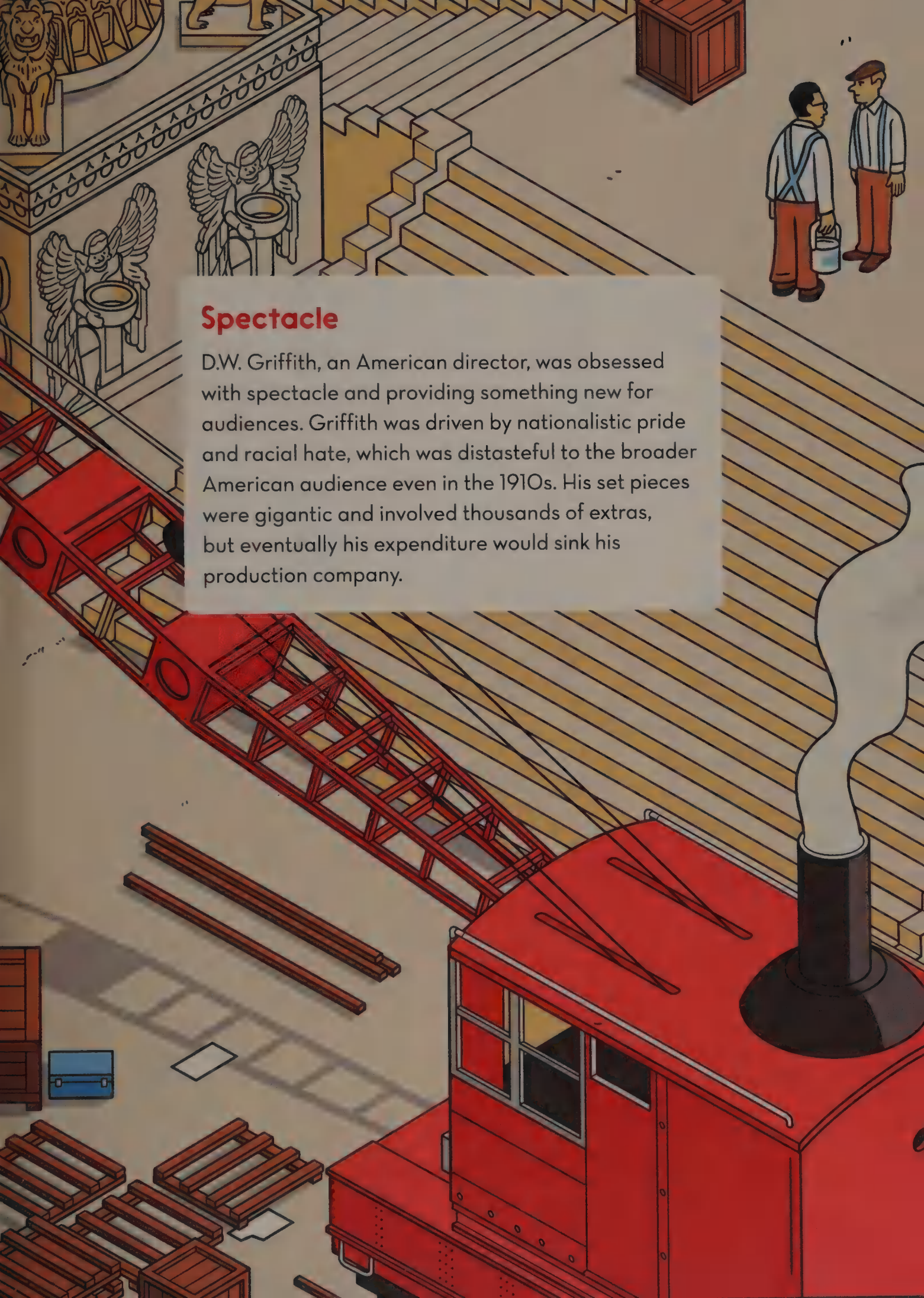
Thomas Edison co-founded the Motion Picture Patents Company (MPPC) in New Jersey, which enforced a ruthless patent monopoly. To avoid restrictive patent law, independents fled to California, which offered natural scenery and excellent lighting conditions for filming. The most popular destination was a town called Hollywood, which would account for the majority of American production by 1913.





The Set of *Intolerance*





Spectacle

D.W. Griffith, an American director, was obsessed with spectacle and providing something new for audiences. Griffith was driven by nationalistic pride and racial hate, which was distasteful to the broader American audience even in the 1910s. His set pieces were gigantic and involved thousands of extras, but eventually his expenditure would sink his production company.



Intolerance (1916) was outrageously expensive to produce. The film flopped so dreadfully that the associated studio had to be sold. The Babylon set stood derelict until 1919, when it was burned down. Griffith was financially ruined for the rest of his life.

Independent Productions

Oscar Micheaux was a wonderfully prolific African-American writer, producer and director. Micheaux held the passionate belief that one could achieve respect and success through hard work and enterprise; he had built a film production company from scratch during a time when African-Americans were subjected to segregation and unmitigated prejudice. His films were the antithesis of D.W. Griffith's work, and *Within Our Gates* (1920) in particular is seen as a direct response to the bigotry of Griffith's *Birth of a Nation* (1915).



OSCAR MICHEAUX



Micheaux actively advertised the banning of his films to attract curious audiences.

Micheaux was known for personally promoting and distributing his films to ensure African-American communities had a chance to see them.

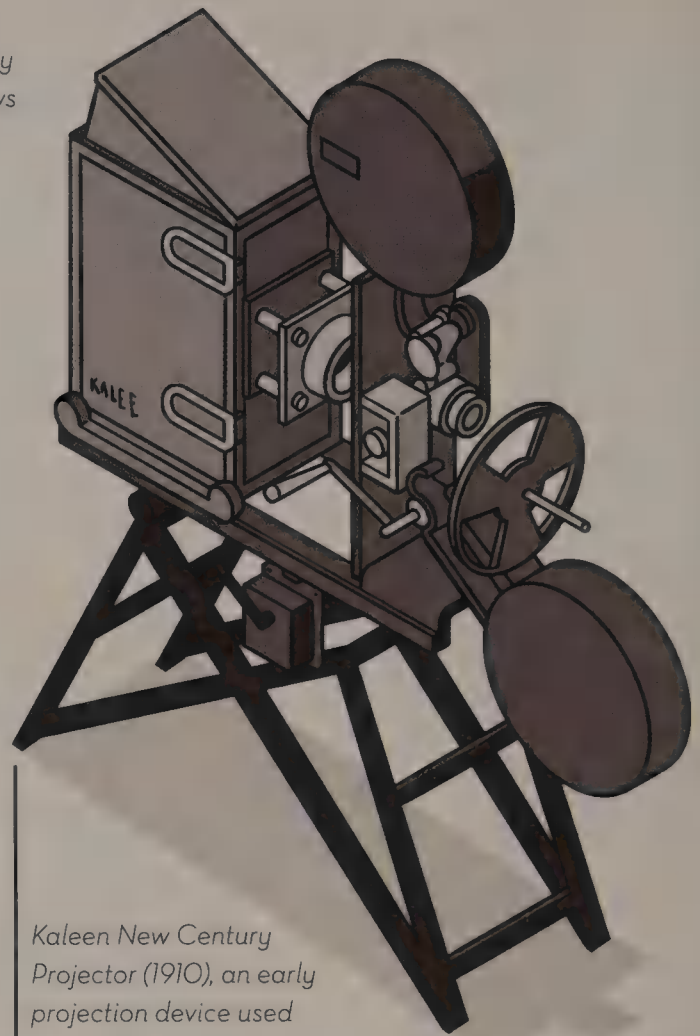


EVELYN PREER

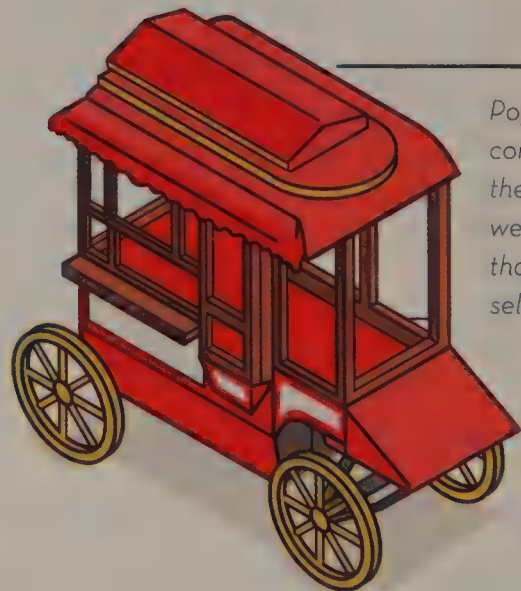
Pioneering actor.



Hyde Park Picture House opened in 1914, one of many cinemas that screened news of the First World War.



Kaleen New Century Projector (1910), an early projection device used in cinemas.



Popcorn carts commonly populated the streets. They were so popular that cinemas began selling their own.

THE CINEMA

As resources were scarce during the First World War, many production teams focused on documenting the conflict. Purpose-built cinemas were erected across Europe to broadcast newsreels and to provide an escape for audiences. Cinemas had a much larger capacity than nickelodeons and were far more comfortable, so nickelodeons declined in popularity.

Ypres, Belgium, during the First World War (1914–1918).



Fearless Feats on Film

As the decade drew to a close, comic filmmakers such as Buster Keaton and Charlie Chaplin were incredibly popular. Comics were especially interested in the showmanship of film, employing stage magic and devious editing to excite and amuse audiences. The American camera operator Elgin Lessley was often the innovator behind the most spectacular camera tricks of the era, and his work with Keaton on *The Playhouse* (1921) involved nine Keatons appearing simultaneously.



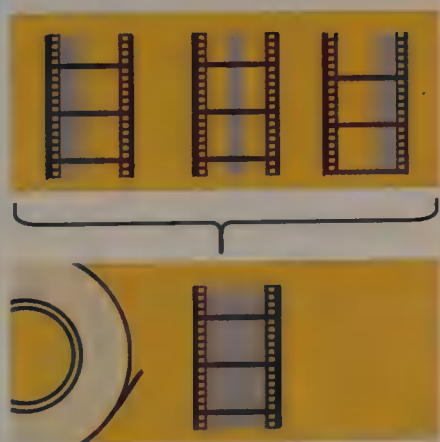
One sequence filmed thrice



Custom aperture



Obscured footage



Masking allowed for multiple takes to be exposed onto one film strip. This is known as compositing.



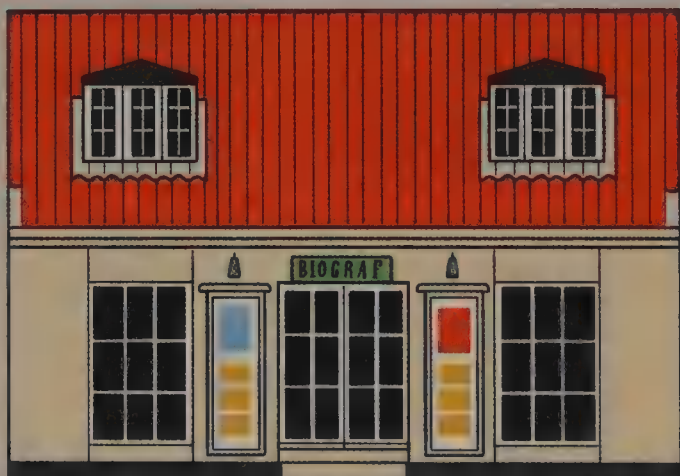
The complete illusion from *The Playhouse* (1921).



CINEMAS THROUGH THE AGES



Stafford Picture House, Stafford, UK (1914)



Dragør Biograf, Dragør, Denmark (1928)



Cine Thesion, Athens, Greece (1935)



Apollo Kino, Vienna, Austria (1929)



Cinema Roma, Asmara, Eritrea (1937)



4 Star Cinema, Kilgore, USA (1987)



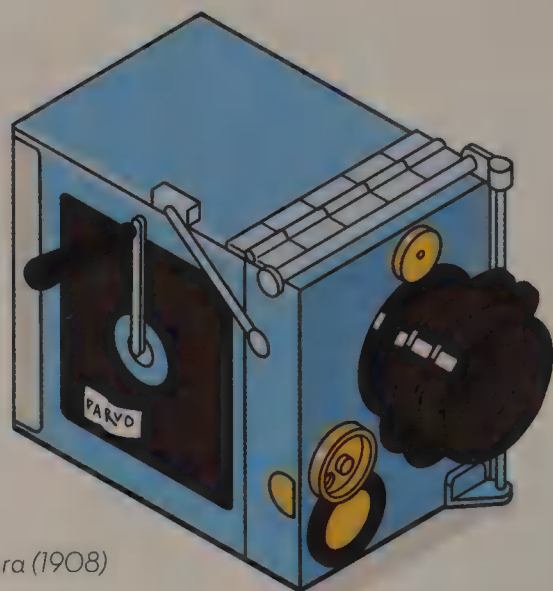
Cinémathèque Leipzig, Leipzig, Germany (1991)



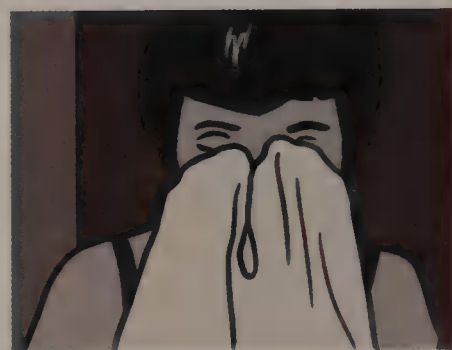
Norton Street Cinema, Sydney, Australia (1998)

THE 1920s

After the civil war in Russia, the newly formed Soviet Union faced the task of rejuvenating its film industry. The stand-out pioneer in state-sponsored shorts was Dziga Vertov. Vertov and his team condensed profound social messages into short films using a technique called “montage”, in which sequences of clips were edited together with bold titles.



Parvo camera (1908)

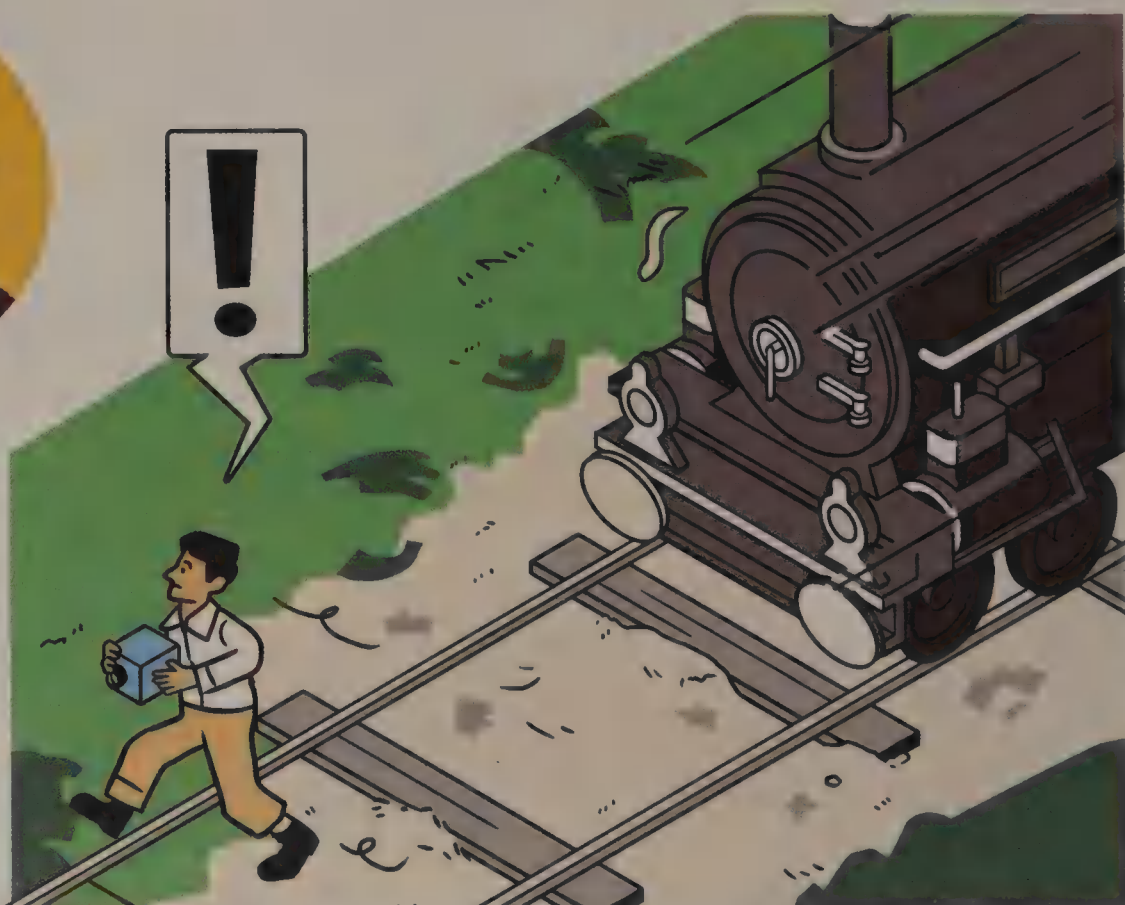


Humorous montage, comparing hygienic routine with that of cleaning around the city.



DZIGA VERTOV

A stunt in Man With a Movie Camera (1919), in which the operator stood in front of a speeding train.



Fresh Filmmaking Communities

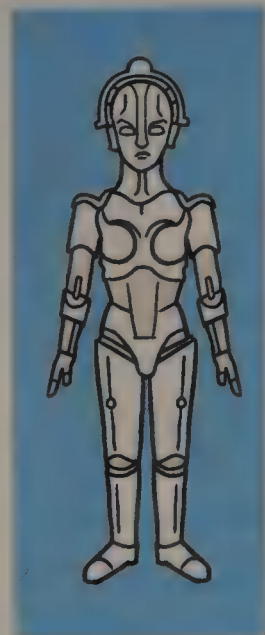
Weimar Germany was a melting pot of artistic movements such as Futurism and Cubism, with the Bauhaus school of art forging new paths in learning and artistic expression. This rousing environment nurtured the German expressionist film movement. The Austrian director Fritz Lang's *Metropolis* (1927) is a perfect example of this aesthetic, although Lang was reportedly rather harsh on his performers and crew.



FRITZ LANG



Brigitte Helm
in costume.



Brigitte Helm as the
Maschinenmensch.

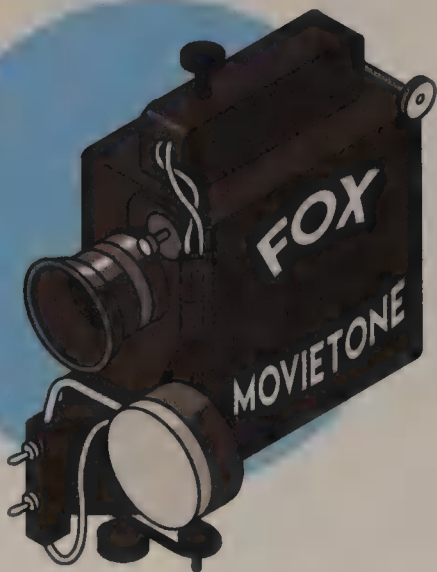
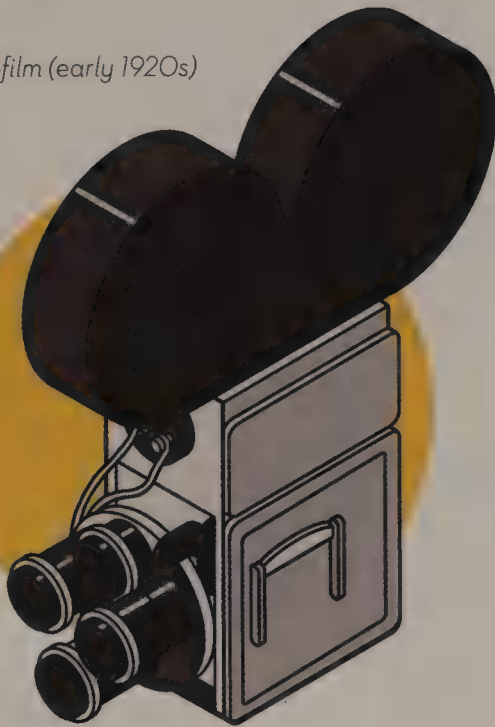


Lang subjected the cast of *Metropolis* to gruelling conditions.

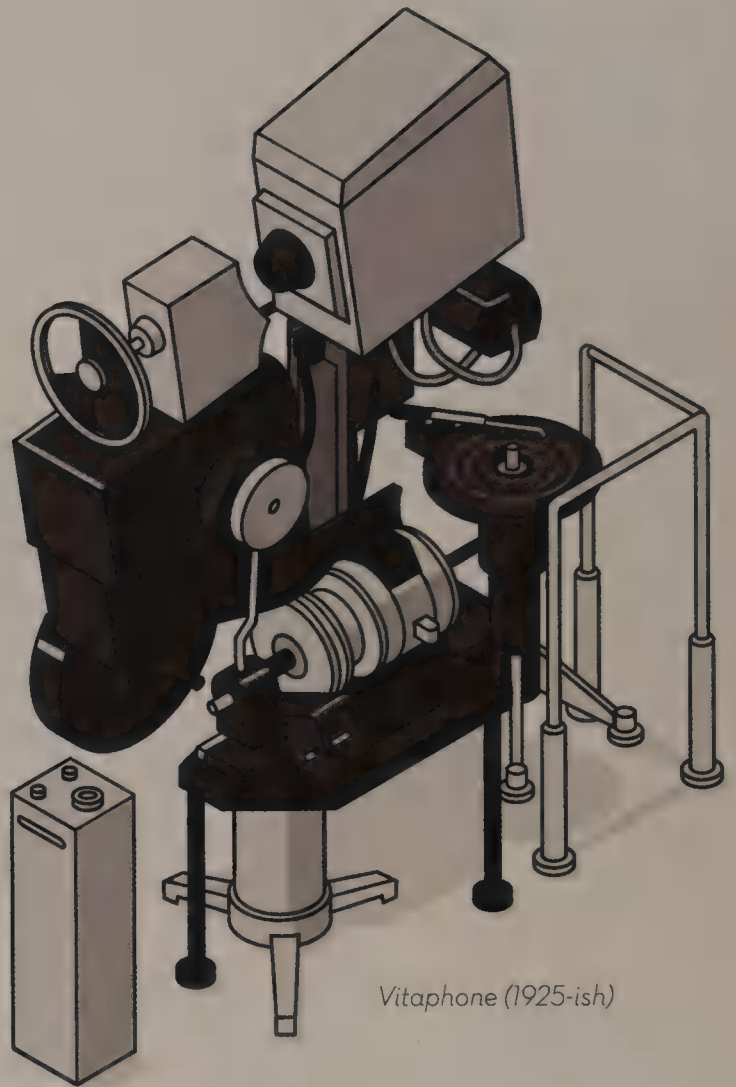
SOUND!

Before sound films or 'talkies', music was performed live alongside the projection of a film. Orchestras would play arrangements for screenings at vaudevilles and spacious cinemas, while pianists and mechanical musical devices accompanied the smaller nickelodeons. The grander movie palaces built in the 1920s often included large theatre organs.

Phonofilm (early 1920s)



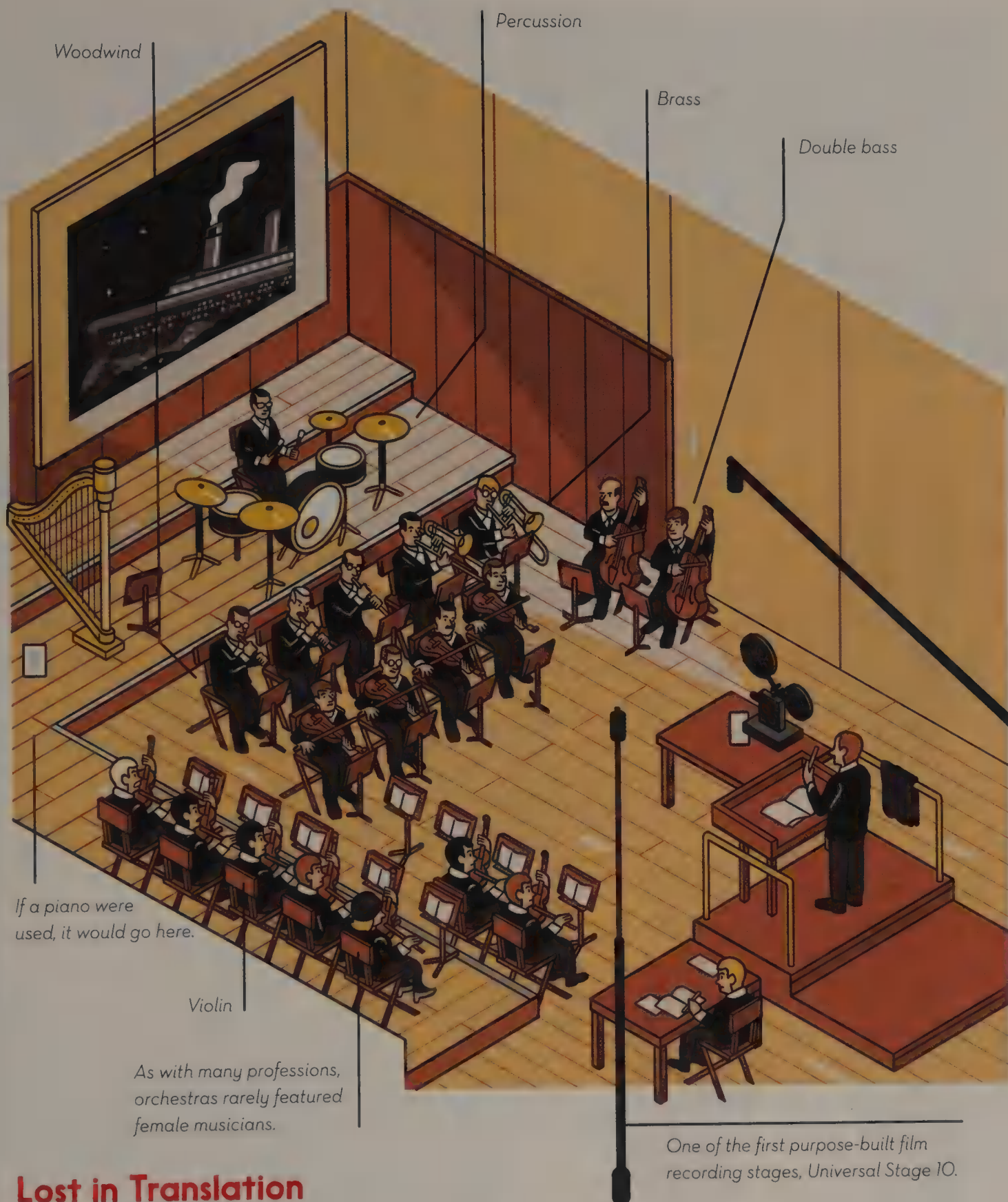
Fox Movietone camera (1926)



Vitaphone (1925-ish)

Early Sound Equipment

The Warner Brothers' Vitaphone was a disc format which gave *The Jazz Singer* (1927) its voice. Once the public had experienced film with sound, there was no return. The Vitaphone itself proved difficult to synchronize with footage, and was followed by a flurry of developments. The Phonofilm and Movietone would remove the difficulties of synchronization by including sound information directly on the filmstrip. By the end of the decade, synchronized sound was the standard for motion picture entertainment.



Lost in Translation

When sound was introduced, audiences were divided by language. The musical genre initially bridged the gap, as dialogue took a back seat to the melody and dance routines. Some productions were filmed in multiple languages. The German director Ewald André Dupont's *Atlantic* (1929) was shot in both German and English by quickly switching out the main cast between takes.

THE 1930s

The Great Depression took a heavy toll on cinema admissions. Exhibitors responded by offering more value for viewers' money with double features. These often included a more cheaply made 'B-feature', followed by the higher quality 'A-feature'.



Frankenstein (1931)



Bride of Frankenstein (1935)



Flash Gordon (1936)



The Invisible Man (1933)



Directors as Stars

Kenji Mizoguchi's films responded to Japan's transition from feudalism to modernity. He is known for his use of extended shots, which required fastidious attention to sets and props from art director Hiroshi Mizutani. His meticulous approach to every aspect of production greatly influenced his contemporaries, and would inform the international New Wave in the 1960s.



Osaka Elegy (1936)



KENJI MIZOGUCHI



Mise en scène applied to direct the viewer's gaze and communicate tone.



ALFRED HITCHCOCK



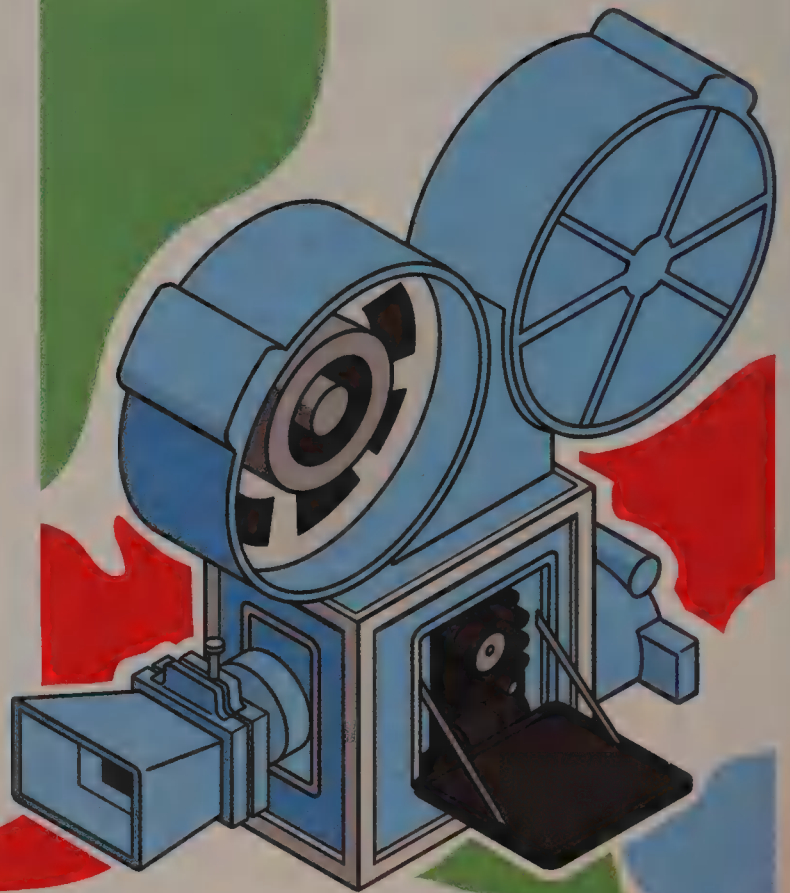
The 39 Steps (1935)

The English director Alfred Hitchcock rose to high acclaim in the 1930s. He combined techniques of montage with the tension of German silent cinema to create a series of masterful thrillers. One technique he seemed eager to apply was rear projection. The method involves projecting footage behind filmed action. For example, *The 39 Steps* (1935) uses rear projection to create the illusion of movement outside train carriages.

COLOUR!

Early attempts to add colour to film involved tinting the stock, which interfered with the sound information exposed on its margins. The American Joseph A. Ball and his engineers built 3-strip Technicolor cameras that separated light using a prism. The spectrums of light were exposed onto 3 corresponding negatives. The developed stock was dyed and transferred onto another stock bearing the sound information.

Technicolor camera (1932)

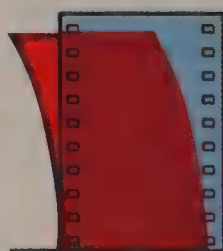


Films sensitive to blue and red light are exposed.

Film sensitive to green light is exposed.

Light enters through the lens.

Magenta filter splits the light.



The exposed film is dyed in their colour.

A single strip for the soundtrack is added.

The four strips are united through a mechanical printing process.

Three-strip Technicolor camera

Colourful Characters

For the first time, costume departments were liberated to explore the full spectrum of colour and found new ways to convey narrative through costume.



Judy Garland as Dorothy
in *The Wizard of Oz* (1939).



Errol Flynn as Robin Hood in
The Adventures of Robin Hood (1938).

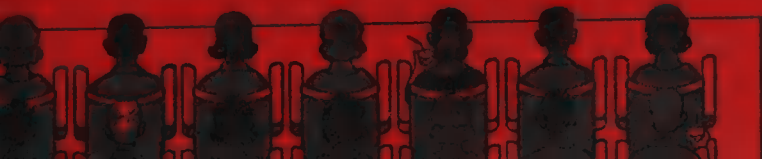


Frank Morgan as the gatekeeper
in *The Wizard of Oz* (1939).



A costume featured
in *The Women* (1939).

Gone with the Wind (1939) The first colour film to receive an Oscar.

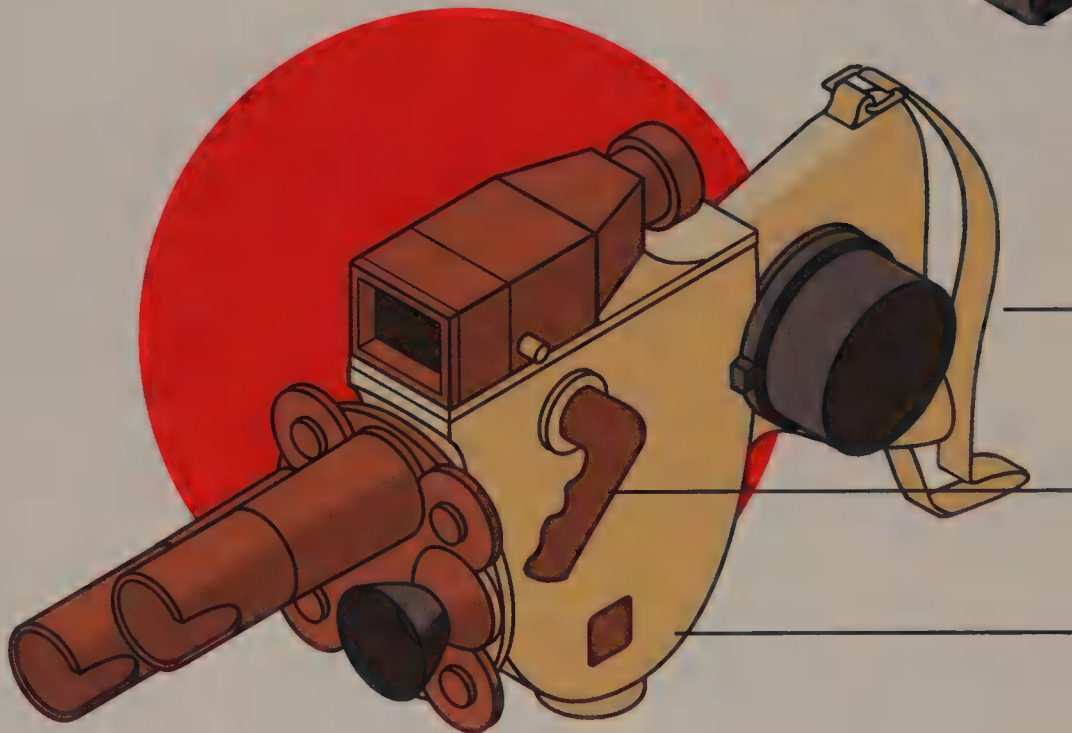


THE 1940s

During the Second World War, the Soviet Union sent at least 400 cameramen to the front line to capture footage. The Nazi party completely nationalised the German film industry, using it as a tool of social manipulation. It is estimated that over 45 million people attended Nazi film screenings.



Arriflex 35mm (1937)



Looks a little too similar to a gun, especially from a distance in a combat scenario.

Pistol-like grip. Held just like a submachine gun.

Khaki colouration.

Cunningham Combat Camera (1945)

Weapons of War

In 1937, the German company Arnold & Richter developed the first reflex 35mm motion picture camera called the Arriflex 35. It had an innovative reflex shutter which enabled the operator to view the image as it was being captured on film. One peculiar imitation was the American Cunningham Combat camera, which looked remarkably like a weapon because of its rifle-shaped profile and khaki finish.

Films from the Front Line

The USA's Office of War Information recruited Hollywood directors and actors to produce propaganda. Frank Capra, known for *It's a Wonderful Life* (1946), directed the *Why We Fight* series including *Prelude to War* (1942). John Ford was drafted into service and produced military training videos such as *Sex Hygiene* (1941).



A Low Point in Humanity (1945)



Aircraft were fitted with film cameras for espionage and testing.



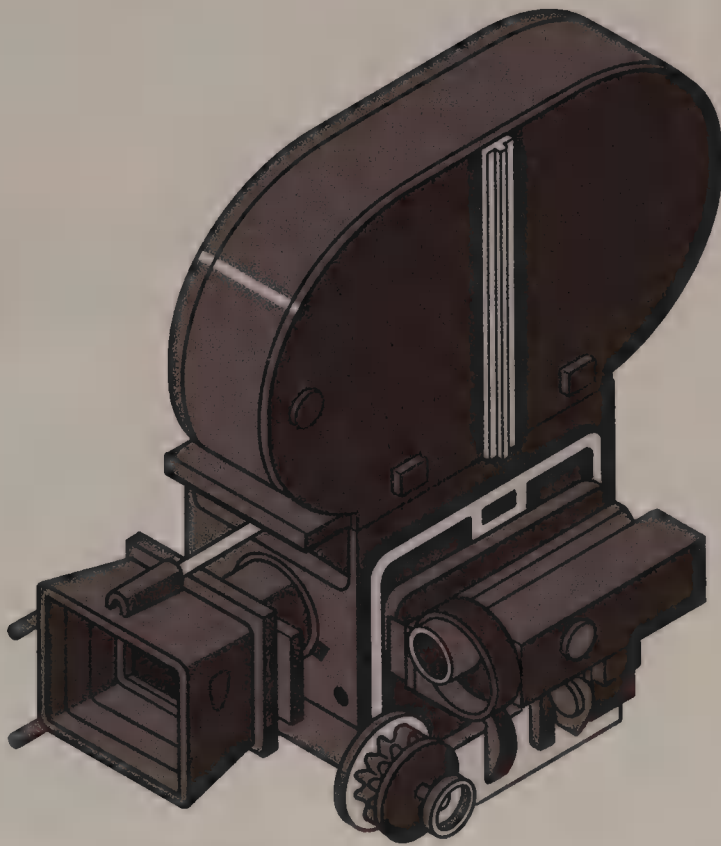
FILM NOIR

The film noir genre thrived on the tension and terror of the war. Film noir cinematography was heavily influenced by the German Expressionism of the 1920s, showing a similar obsession with capturing sharp forms through a mixture of lighting, set design and costume. The marvellous Orson Welles produced, directed and starred in his film *Citizen Kane* (1941), which is perhaps the first of this genre. The non-linear story is relayed by a variety of biased narrators, creating a disjointed mystery for the viewer to solve.



ORSON WELLES

Director, actor and Martian invasion hoaxer.



Mitchel BNC (1935)





Citizen Kane (1941)

Welles's magnum opus, and probably the definitive film of its genre.



Young Kane



Old and cranky Kane

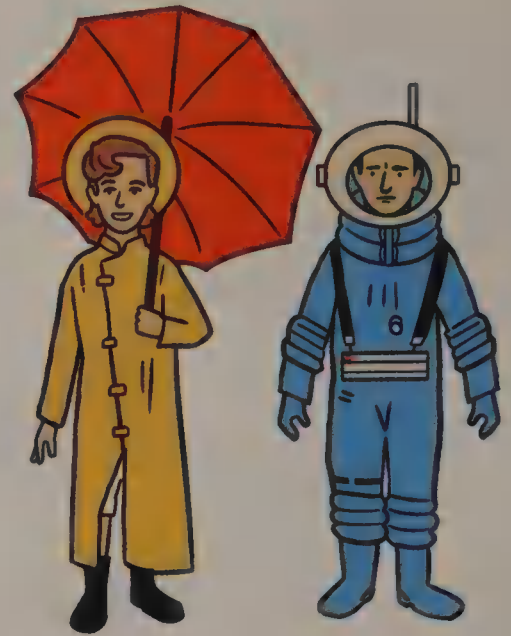


GREGG TOLAND

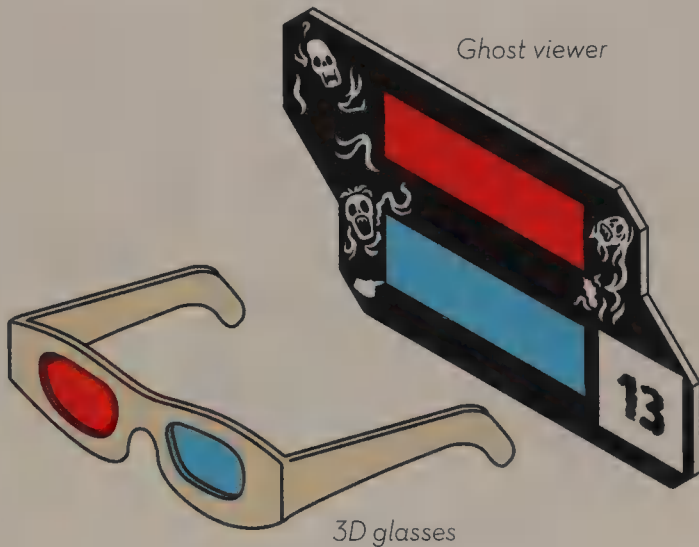
The American cinematographer Gregg Toland pioneered various techniques to capture striking deep focus footage. This meant that the foreground, middle-ground and background of a shot were all in focus, allowing scenes to be dense with action and subtle meaning. Toland modified a Mitchell BNC camera with a remote focus mechanism, and strategically placed carbon arc lamps to intensify the lighting conditions required for the deep focus effect.

THE 1950s

Cinema attendance gradually fell during the 1950s. One contributing factor was the post-war exodus of young families from the cinema-packed cities into quiet suburbs. Studios addressed this problem by building drive-in theatres which often showed double features to entice audiences with tight budgets.



Debbie Reynolds, *Singin' in the Rain* (1950)
Destination Moon (1950)



Ghost viewer

3D glasses

Gimmicks

Many films and cinemas experimented with gimmicks to attract audiences. William Castle was particularly known for his creative devices. During performances of *The Tingler* (1959), timed buzzers in seating gave audiences a jolt when the titular parasite appeared on screen.



Drive-in movie



HENRI CHRÉTIEN

Widescreen

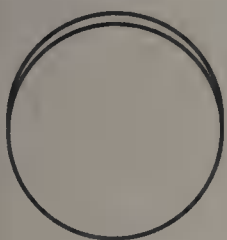
The French astronomer and inventor Henri Chrétien developed an anamorphic lens for tanks during the First World War. His lenses were oval-shaped, allowing a 180-degree field of view, and were used to create the CinemaScope widescreen effect. The American camera technician Robert Gottschalk continued this work and built the Panavision camera, which would become standard equipment by the late 1960s.



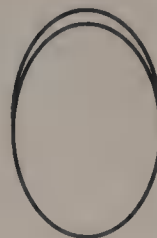
Anamorphic lenses were developed for French tanks.



Early Panavision camera



Normal Lens



Anamorphic lens



Squeeze in that extra horizontal detail!

SAMURAI AESTHETIC

After the war, the Japanese film industry was liberated from Imperial nationalisation. A new breed of ambitious directors emerged, the most influential of which was Akira Kurosawa. Kurosawa, like Mizoguchi before him, was a master of mise en scène; the composition of set pieces, props and actors were all highly considered to communicate narrative.



AKIRA KUROSAWA



Beautifully balanced mise en scène in Rashomon (1950).



Kurosawa painted his very own concept art and storyboards.



Yojimbo (1961)



SANJURO

Seven Samurai (1954) resonated with international audiences and had a lasting impact on subsequent action films. Kurosawa's later work *Yojimbo* (1961) was unofficially adapted by Sergio Leone in his Western *A Fistful of Dollars* (1964).



THE MAN WITH NO NAME

A Fistful of Dollars (1964)



The Set of *Seven Samurai*

Kurosawa had a fastidious attention to world-building, producing fictional biographies and extremely detailed reference books.



Working with the cinematographer Asakazu Nakai, Kurosawa organised three separate camera groups to work simultaneously in order to capture as much action as possible, even if candid!





Tally sheets were used to record the number of bandits 'killed' to ensure continuity.

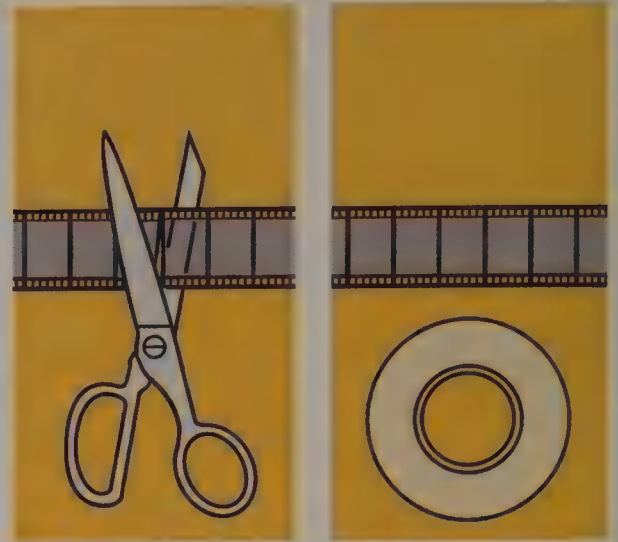


Seven Samurai was the most expensive film ever made in Japan. Budget issues caused the production to cease several times, but apparently Kurosawa was confident that the film would be completed. He simply went fishing during breaks.

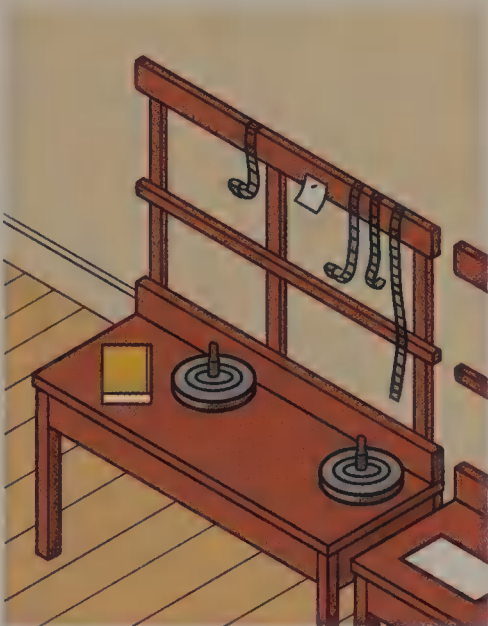
EDITING

Film editing is the practice of applying structure and a visual language to moving images. The very first films were pretty much moving vignettes, and lacked what we now expect in continuity.

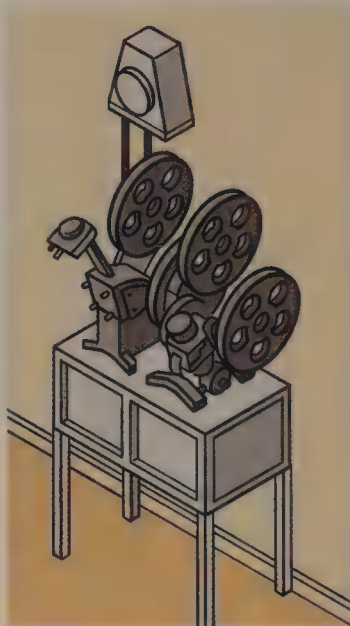
Filmmakers became more ambitious towards the end of the 1890s and included multiple shots within one production. Prior to the invention of specialist equipment, the first editors used scissors and tape to literally cut and join copies of the negative.



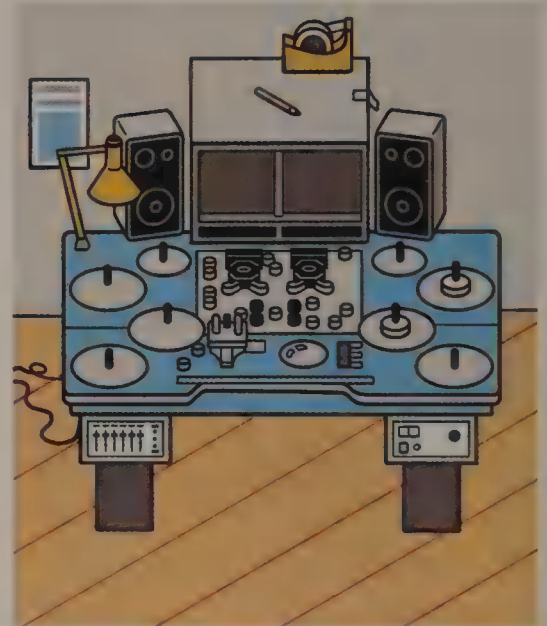
Scissors and tape; the original editing tools.



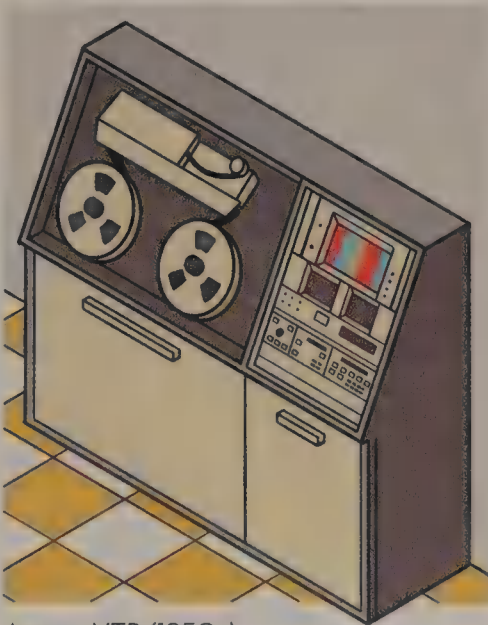
Early editing set up (1890s).



Moviola (1924)



Steenbeck flatbed (patented 1934)



Ampex VTR (1950s)

Opportunities for Women

The creative industry had a tradition of prejudice towards women, something which has unfortunately endured. However, in the early days of film, editing was considered a technical role which allowed many women to enter the industry and have significant authorship in films.



THELMA SCHOONMAKER

Martin Scorsese's film editor.



CMX editing suite (1970s)



EditDroid (1983)



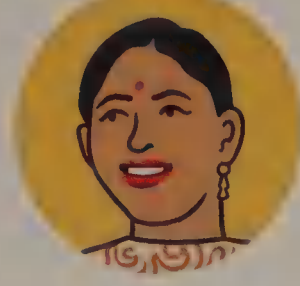
Modern-ish editing suite.



ANNE V. COATES



DEDE ALLEN



BEENA PAUL

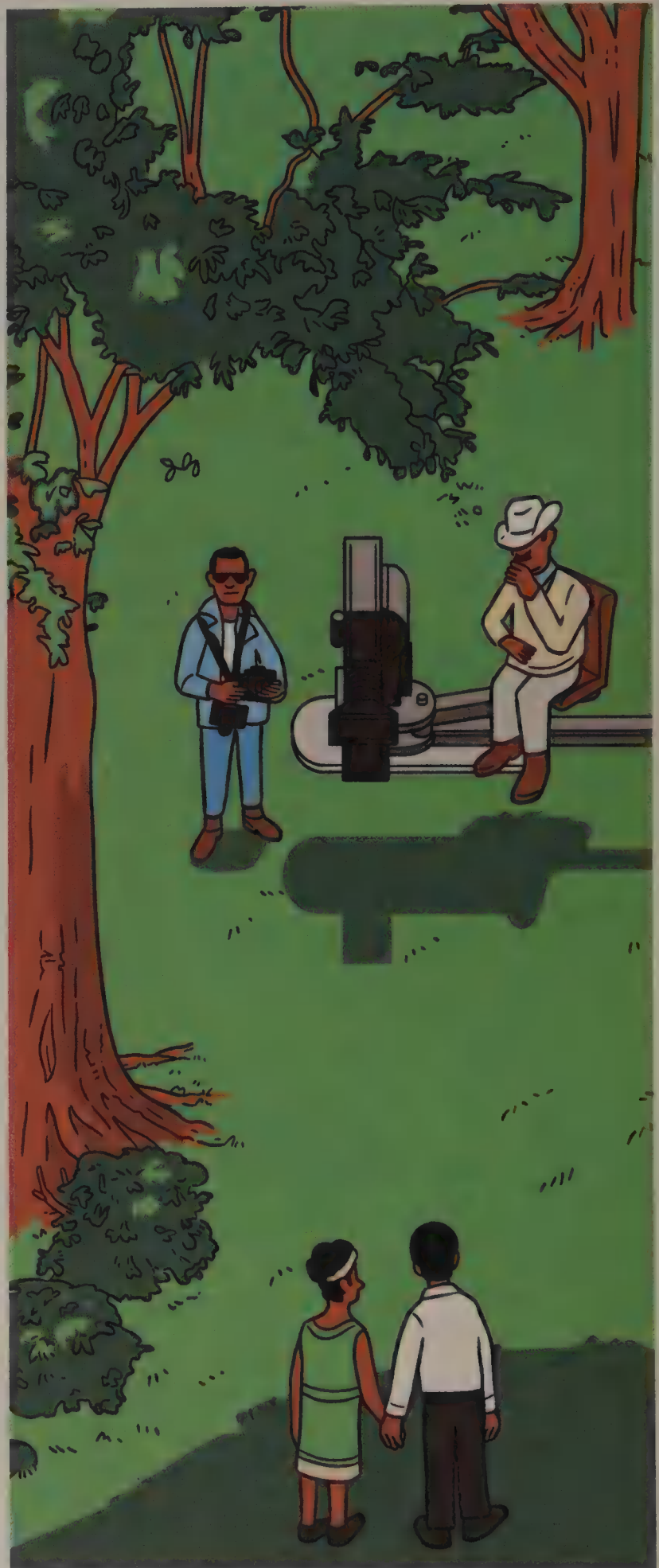
THE 1960s

Hollywood's Production Codes, which set out the moral guidelines for all major studios, buckled under repeated offences. America's filmmakers and audiences alike had long been exposed to liberal scenes of sex and violence thanks to European cinema. In addition, a post-Stalinist Russia was free to explore themes that had previously been forbidden by the regime.



Civil Rights

The Civil Rights Movement in America encouraged filmmakers to address and explore complex racial issues. The photographer and filmmaker Gordon Parks became the first African-American to direct a film with a major studio. His debut production *The Learning Tree* (1969) was an adaption of his partially autobiographical novel. Parks had an exceptional amount of creative control over the project: he wrote the screenplay, composed the music, directed and co-produced the film.



The Learning Tree (1969)

New Epics

India declared itself a democratic republic in 1950. Government funding nurtured national productions, and Hindi cinema in particular was highly productive. *Mughal-e-Azam* (1960) took over a decade to produce and was incredibly expensive. The art director M. K. Syed oversaw the production of huge, extravagant set pieces, some of which took over a month to build. The battle sequence alone involved over 8,000 soldiers in full armour.



ASIF FARUQI

Director of *Mughal-e-Azam*



Mughal-e-Azam (1960)

THE FRENCH NEW WAVE

Leading the charge in filmmaking was the French New Wave, which promoted the director as an auteur and broke away from old conventions. Jean-Luc Godard preferred to avoid formal scripts and enjoyed beginning a day's filming with just a handful of notes to help improvise camera work, script and direction. Many films of the time were overly concerned with clear continuity, but New Wave experimented with jarring jump-cuts to save production costs and challenge the viewer.

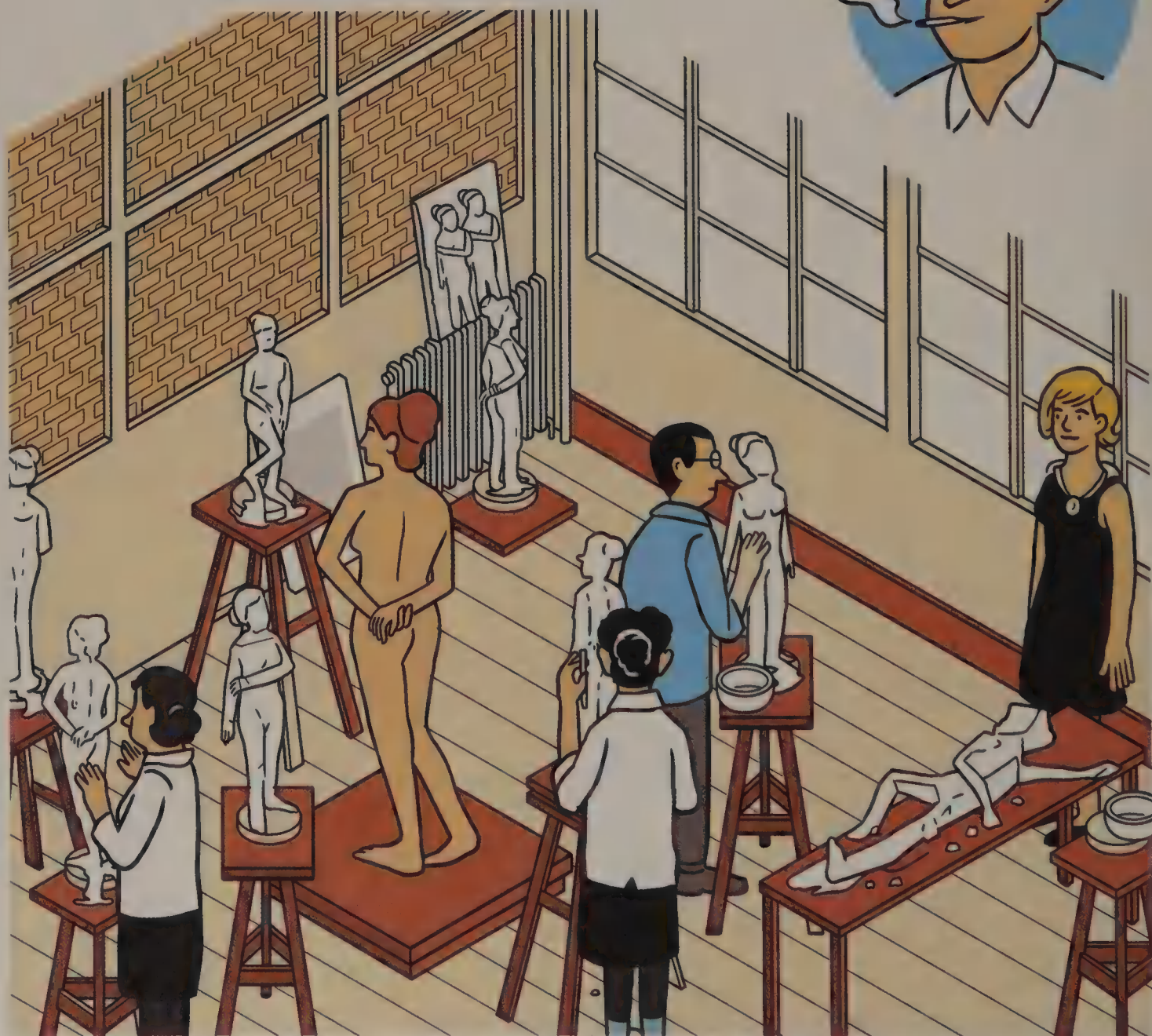


**AGNES
VARDA**

*Director of
Cleo from 5 to 7*

**JEAN-LUC
GODARD**

Director



Cleo from 5 to 7 (1962)



**MIKE VAN
BRITTAN BROWN**

*Inventor of the closed-circuit
camera for the home (1966).*



**PIERRE
ANGÉNIEUX**

*One of the inventors
of the modern zoom lens.*



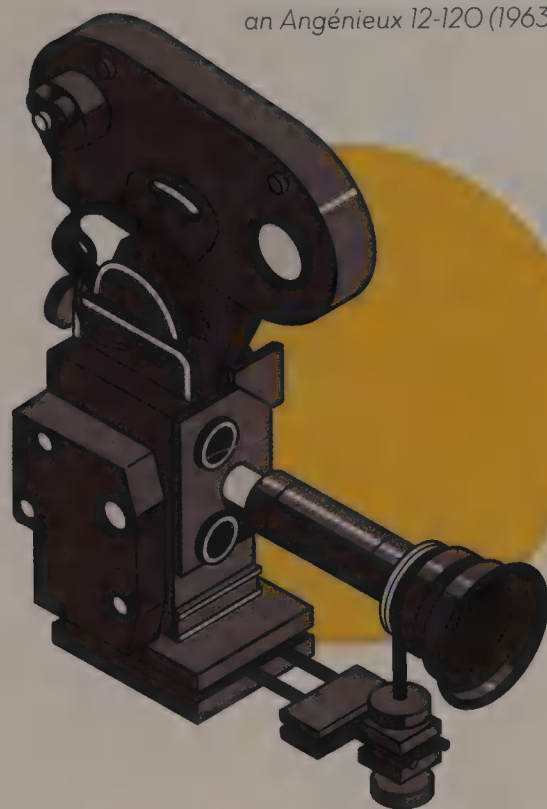
*Jean-Paul Belmondo,
Pierrot le Fou (1965)*



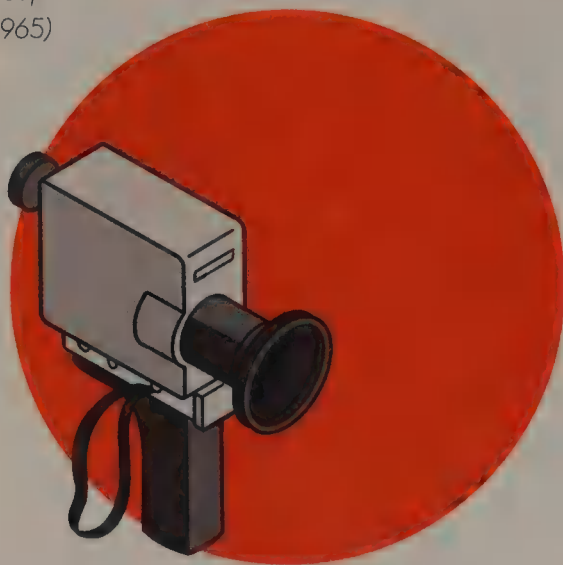
*Jean Seberg,
Breathless (1960)*



*A Bolex camera fitted with
an Angénieux 12-120 (1963)*



*Nizo Super 8
(1965)*



In 1963, French engineer Pierre Angénieux marketed a zoom lens that could move from 12mm to 120mm; a considerable improvement compared to previous lenses. The new zoom lenses became popular with home movie Super 8 cameras as well as for larger commercial films.

THE 1970s

Many film productions assimilated and regurgitated other cultures. A whole range of 'exploitation' films were made, including blaxploitation films, which were specifically targeted to an African-American audience. While initially very popular and still influential, many blaxploitation films did little more than reinforce stereotypes.



Richard Roundtree,
Shaft (1971)

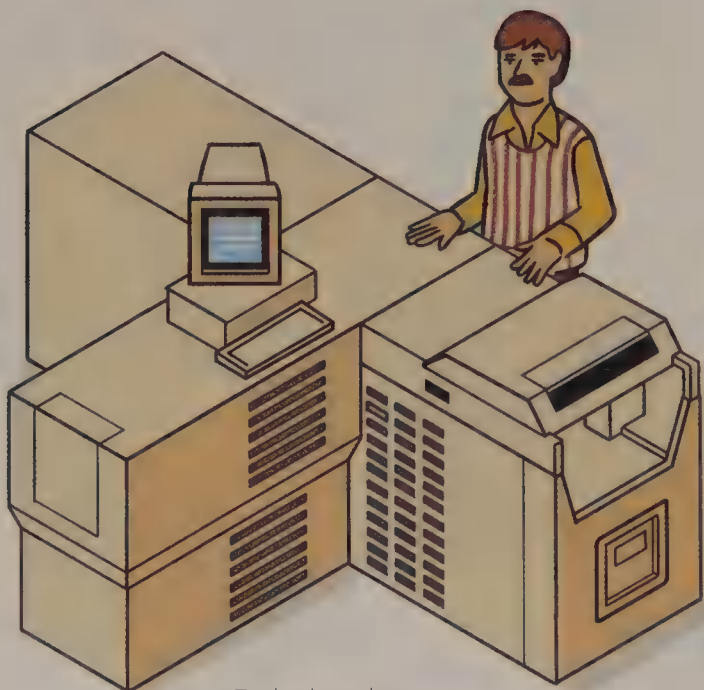
Pam Grier,
Coffy (1973)



Production
photographers



Illustrator



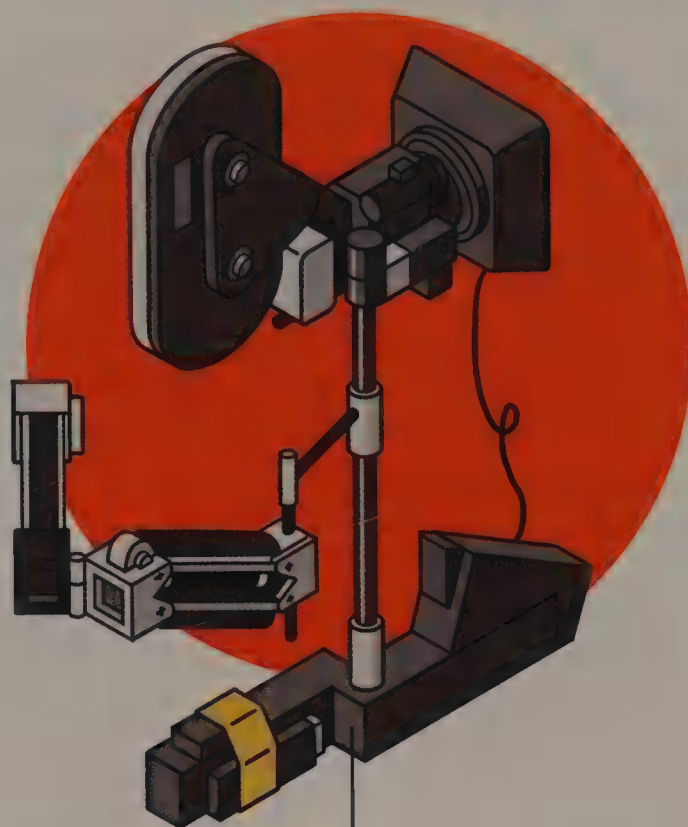
Early digital printing



A fictional film poster.



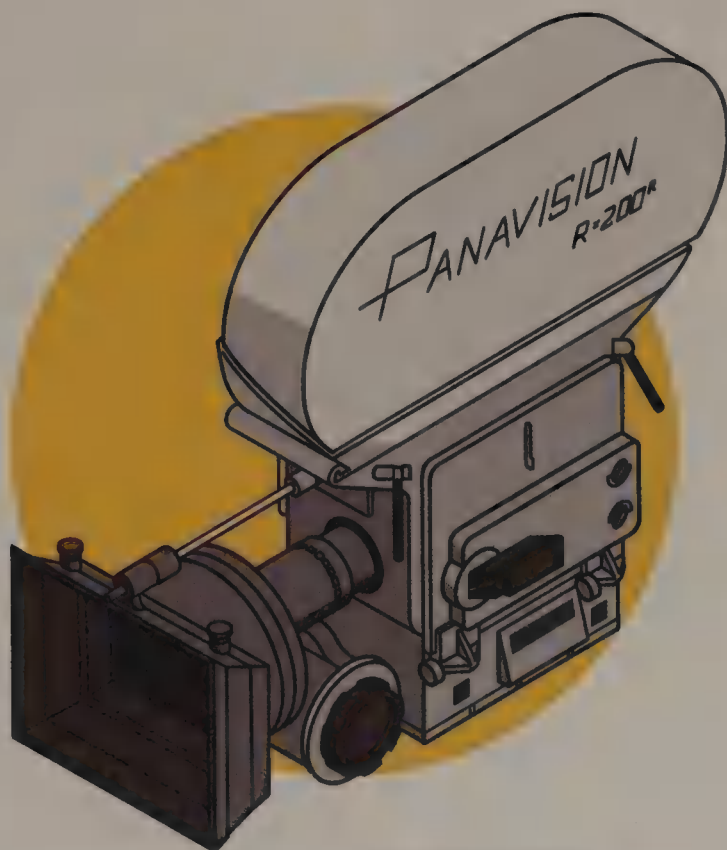
An imitation Panaglide as used in Halloween (1978).



An early Steadicam rig used in Rocky (1976).

Magnificent Mobility

Historically, smooth movement was achieved with wheeled mounts called 'dollies'. Dollies relied on boards or tracks, which took time to assemble; and even the most careful operators could not eliminate shaky footage when carrying the camera. American camera operator Garret Brown invented the Steadicam in 1975. The Steadicam harness dampened the jolting movements of the operator, producing smooth footage at a lower cost than dolly systems. The system was imitated by various companies such as Panavision's Panaglide, but Steadicam has stood the test of time and continues to be used today.



Panavision camera

STAR WARS

The young George Lucas was already somewhat known for his film *American Graffiti* (1973), when he approached 20th Century Fox with something he called *Adventures of Luke Starkiller, as taken from the Journal of the Whills, Saga I: The Star Wars*. He sacrificed \$500,000 from his fee in order to take all merchandising and licensing fees, which would ultimately make him incredibly rich. The film was eventually known as *Star Wars* (1977) and changed popular culture forever.

The movement of the camera around the stationary TIE fighter creates the illusion of flight.



GEORGE LUCAS

Director and writer



MARCIA LUCAS

Editor



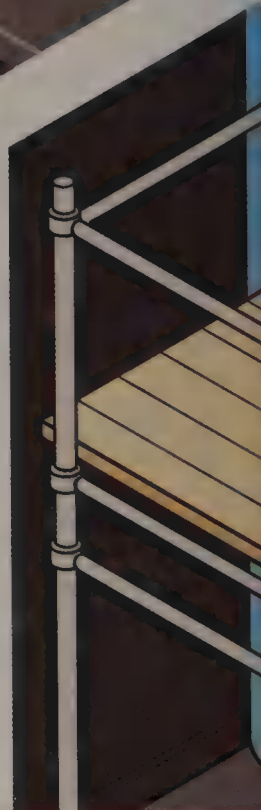
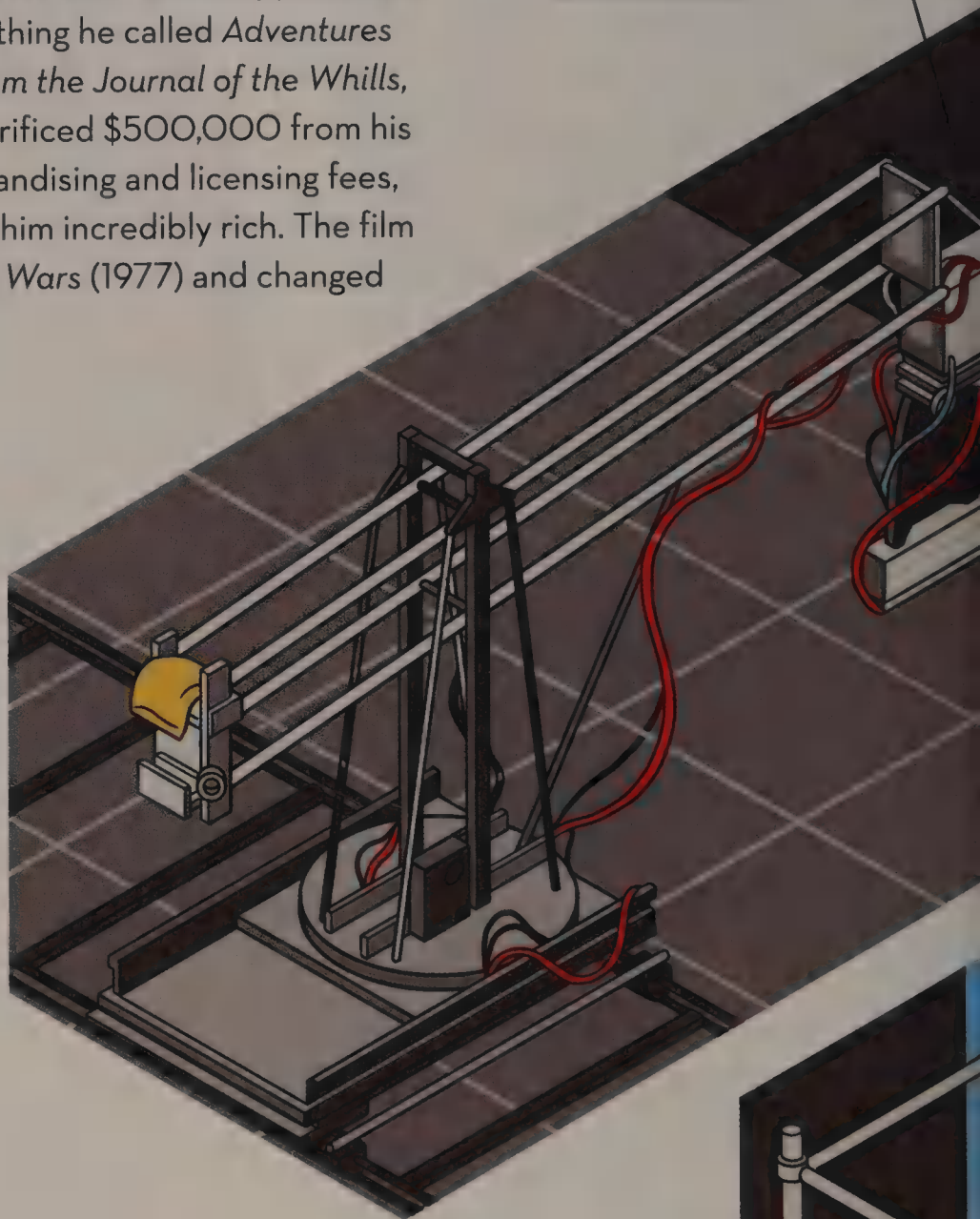
PAUL HIRSCH

Editor



RICHARD CHEW

Editor



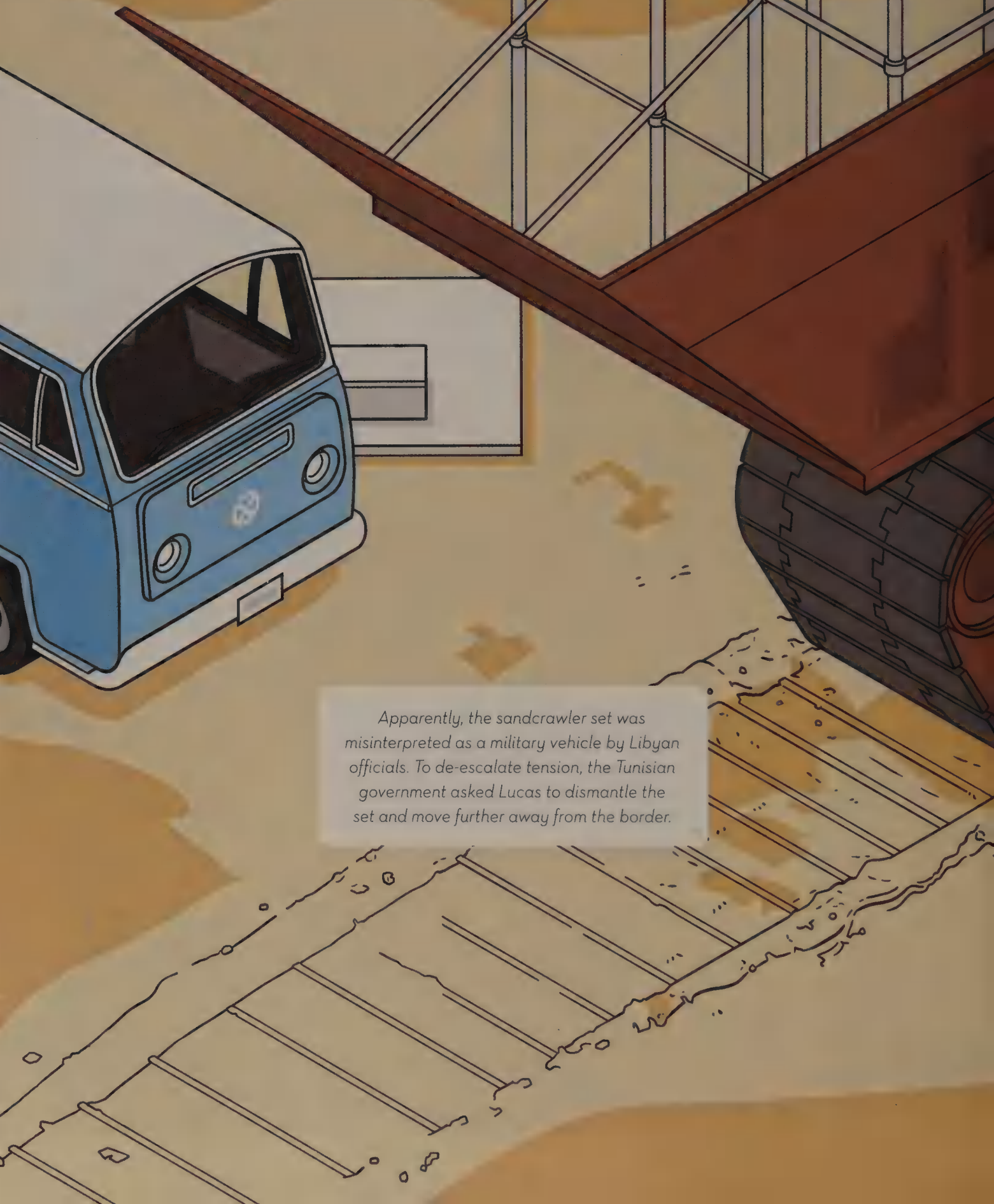
Originally, the TIE fighters had blue detailing, but it was removed to avoid issues with the chroma key (see page 87).

Revolutionary Visual Effects

The post-production of Star Wars involved a revolutionary combination of special effects. Everything from the use of miniatures, blue screen, costumes and symphonic score created a cinematic masterpiece that has enthralled audiences for over 40 years.



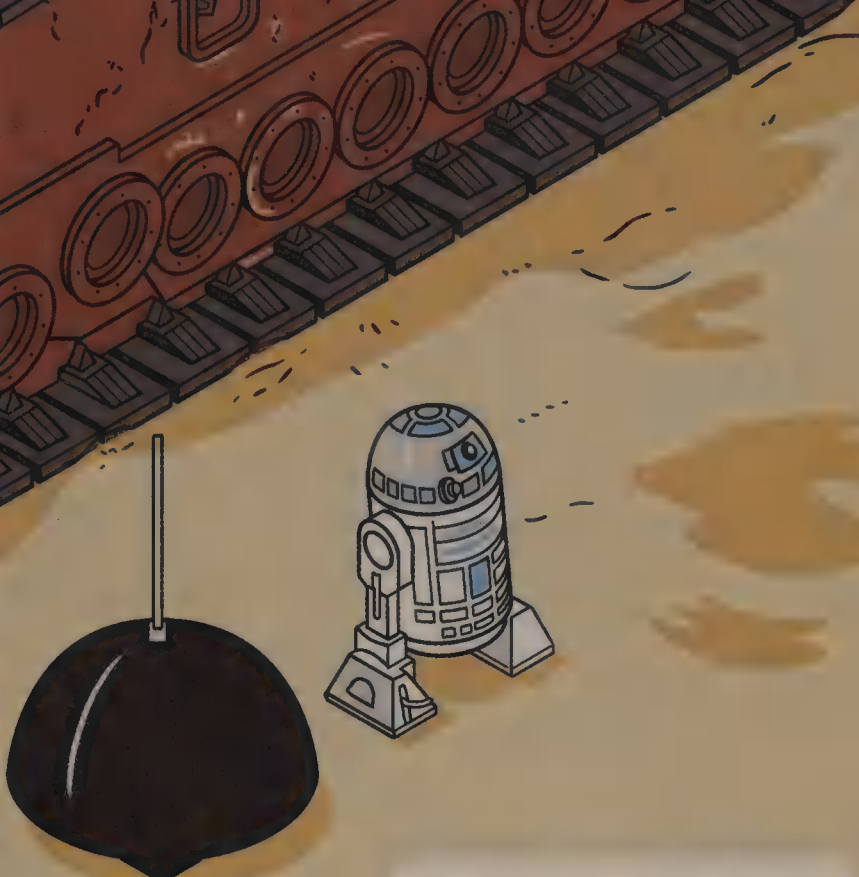
The Set of *Star Wars*



Apparently, the sandcrawler set was misinterpreted as a military vehicle by Libyan officials. To de-escalate tension, the Tunisian government asked Lucas to dismantle the set and move further away from the border.

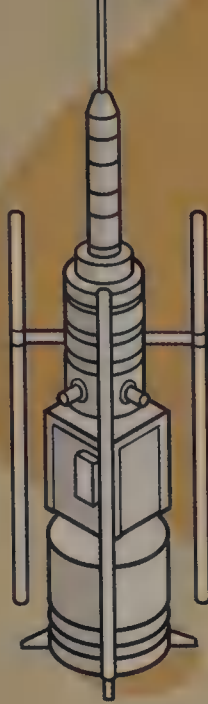


'Jawas' were played
by little people and children.

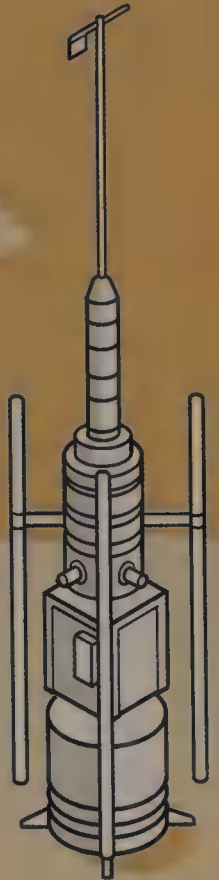


On set photographs reveal several interesting ways the crew tried to stay cool under the Tunisian sun.





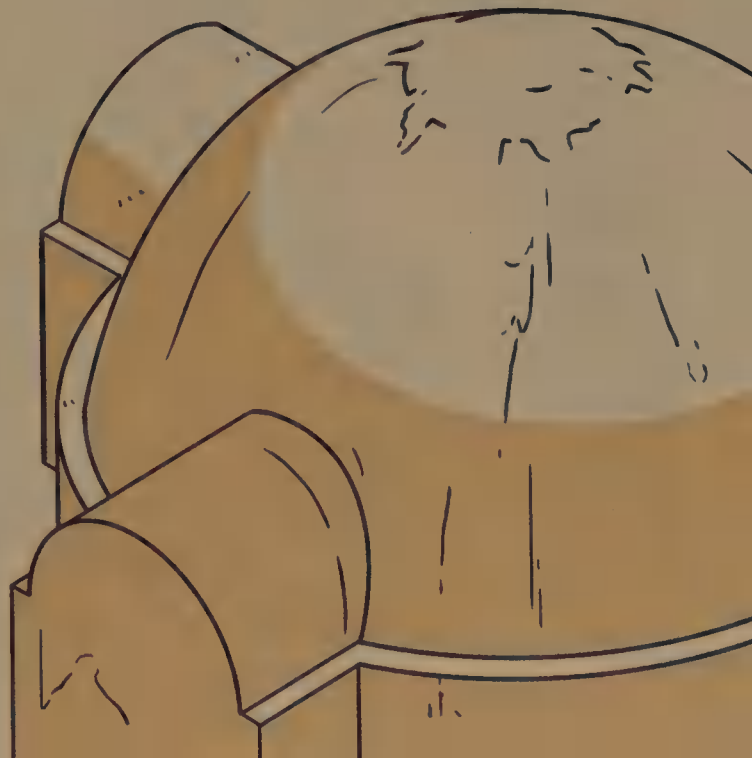
This R2 unit has
a bad motivator!



Many of the original sets remain
to this day as relatively popular
tourist attractions.



The C-3PO costume didn't allow the actor,
Anthony Daniels, to sit down. A portable
board was built for him to lean on.



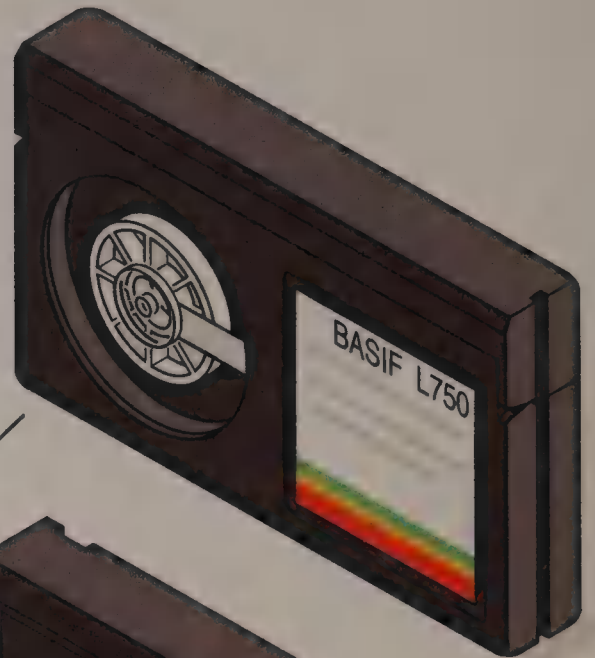
THE 1980s

The constant pursuit of the next biggest blockbuster led studios to spend more on each film, meaning creative decisions were often based on what would generate profits. The wildly successful Star Wars franchise proved that returns from merchandising could far exceed those from the box office.

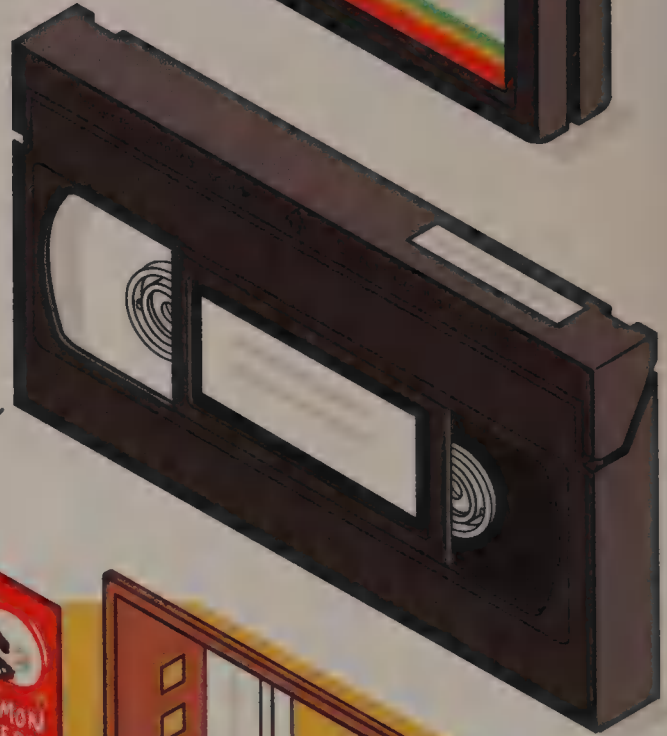
The Betamax War

The VHS became triumphant in the format war with Betamax, leading to a boom in the VHS rental and sale market. The straight-to-video market allowed many filmmakers to distribute their movies at low cost.

Betamax



VHS (Video Home System)





CGI

Computer-generated imagery, born in the 1960s, developed rapidly in the 1980s as the computer became more widely used in the workplace and at home. *Tron* (1982) featured an ambitious 15 minutes of 3D rendered imagery, while *Indiana Jones and the Last Crusade* (1989) involved the first digital composite to create a rapid ageing effect without cutting away.



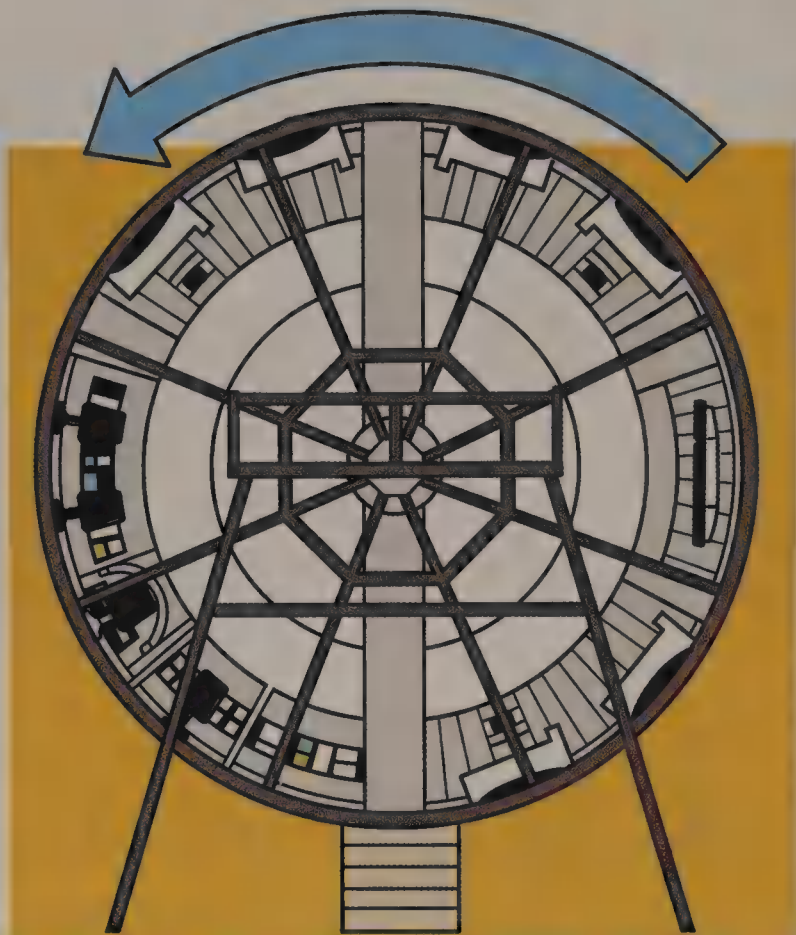
Tron CGI sequence

SYNTHETIC ENVIRONMENTS

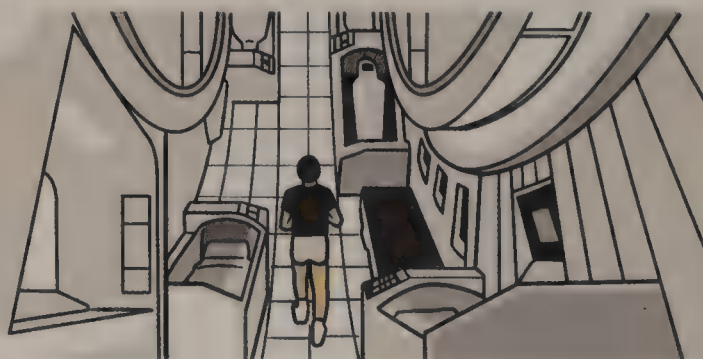
The American director Stanley Kubrick was fastidious in his approach to pre-production. For *2001: A Space Odyssey* (1968), Kubrick collaborated with NASA and science fiction writer Arthur C. Clarke to create an accurate portrayal of futuristic space technology.



STANLEY KUBRICK



Illusion of centripetal space station achieved with a gigantic centrifuge.



The camera was fixed inside the centrifuge, making it seem that Keir Dullea was the one in motion.



Keir Dullea as Dave in 2001: A Space Odyssey.



The Monolith.

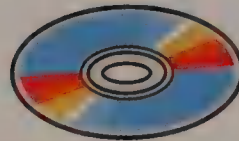
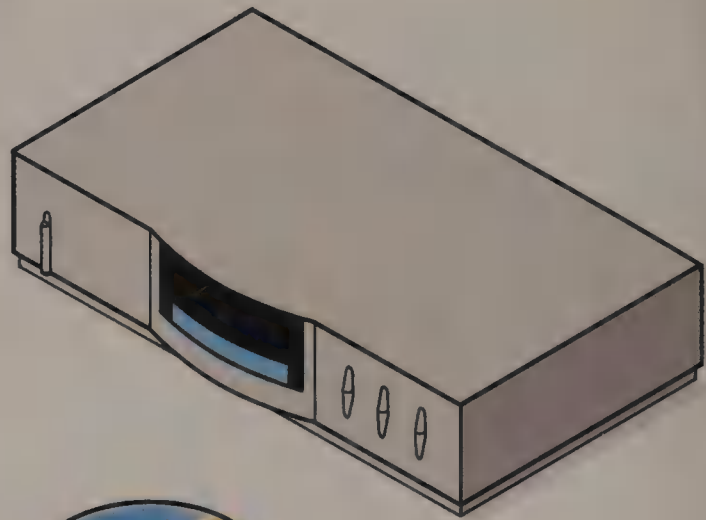


His Vietnam war film *Full Metal Jacket* (1987) was shot entirely in England, but Kubrick imported a small forest of palm trees from Spain to create the impression of a tropical location. Obsessive photographic research also helped set and costume designers to create an accurate façade of war-torn Vietnam during the 1960s and 70s.

The Vietnam set, built entirely on a London location.

THE 1990s

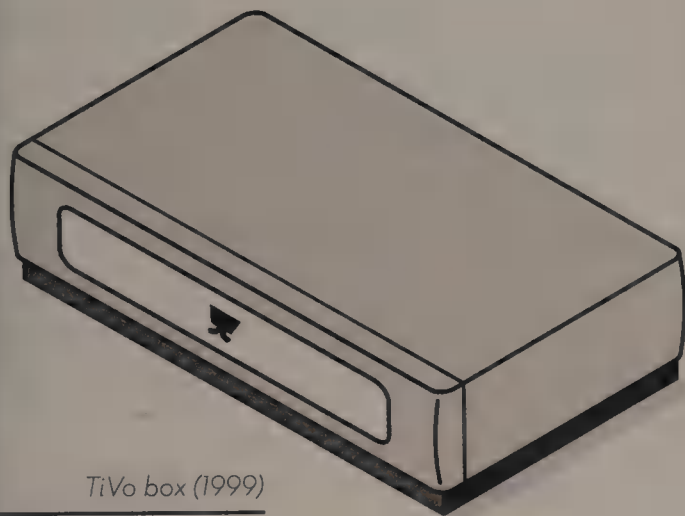
Elements from two competing disc formats were combined to create the Digital Versatile Disc (DVD). DVDs offered far more than VHS, as they had superior quality, more storage and were cheaper to manufacture. Broadcast television viewership continued to decline compared to cable networks. The TiVo digital video recorder debuted in 1999, starting the era of on-demand video.



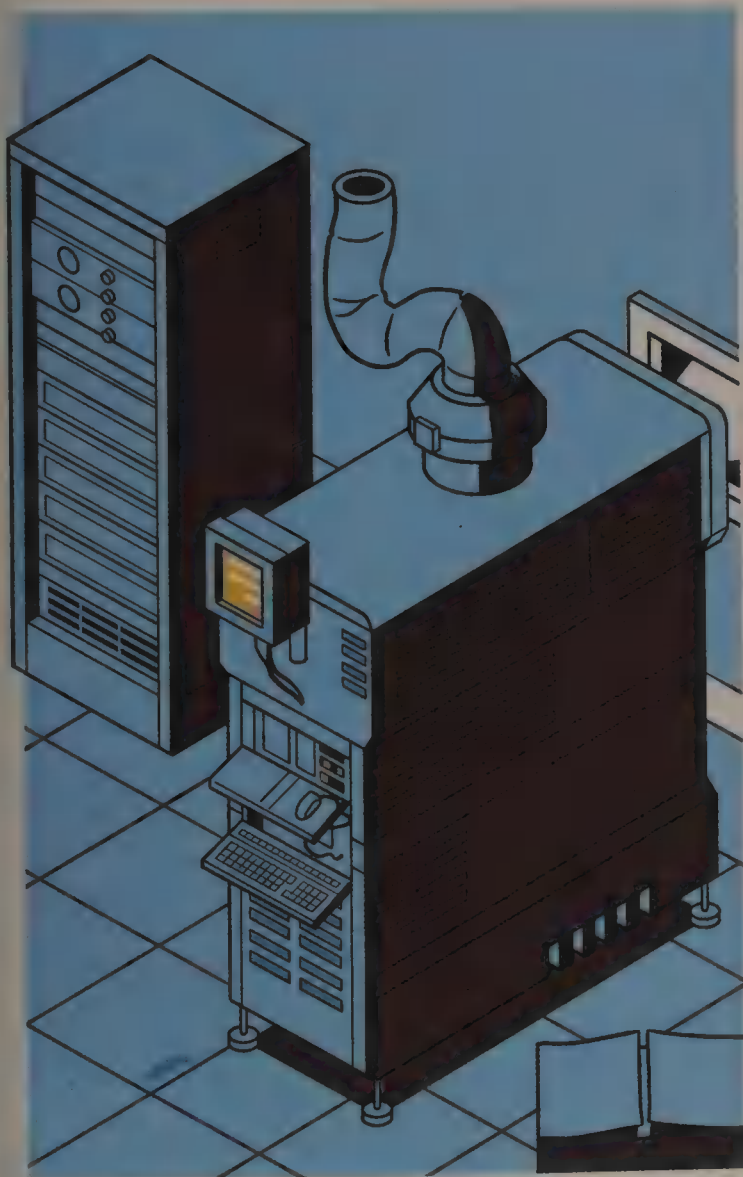
*Toshiba SD-2006
DVD player (1997)*



A loose interpretation of a teenager's bedroom in the 1990s.



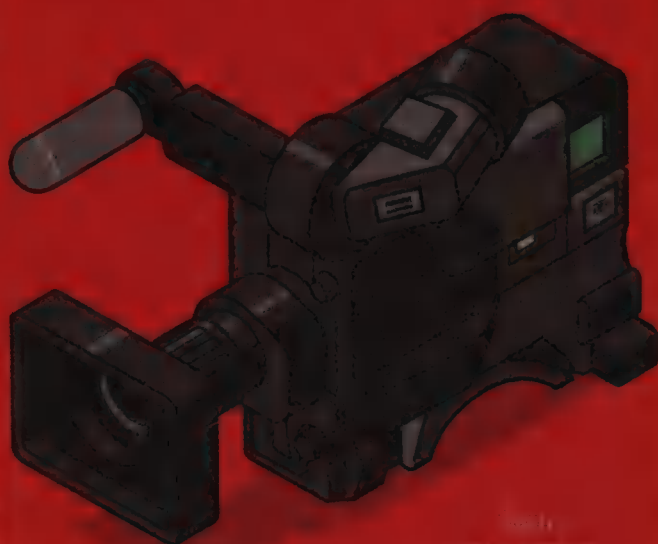
TiVo box (1999)



Early digital projector

The Digital Age

Sony's Solid State Electronic Cinematography cameras were responsible for the first all-digital film, *Rainbow* (1996). *Star Wars: Episode I – The Phantom Menace* became the first film to be widely projected digitally using the prototype DLP cinema projectors, leading Lucas to film the subsequent *Star Wars* prequels entirely digitally.



Sony
HDC-1000
(2000)



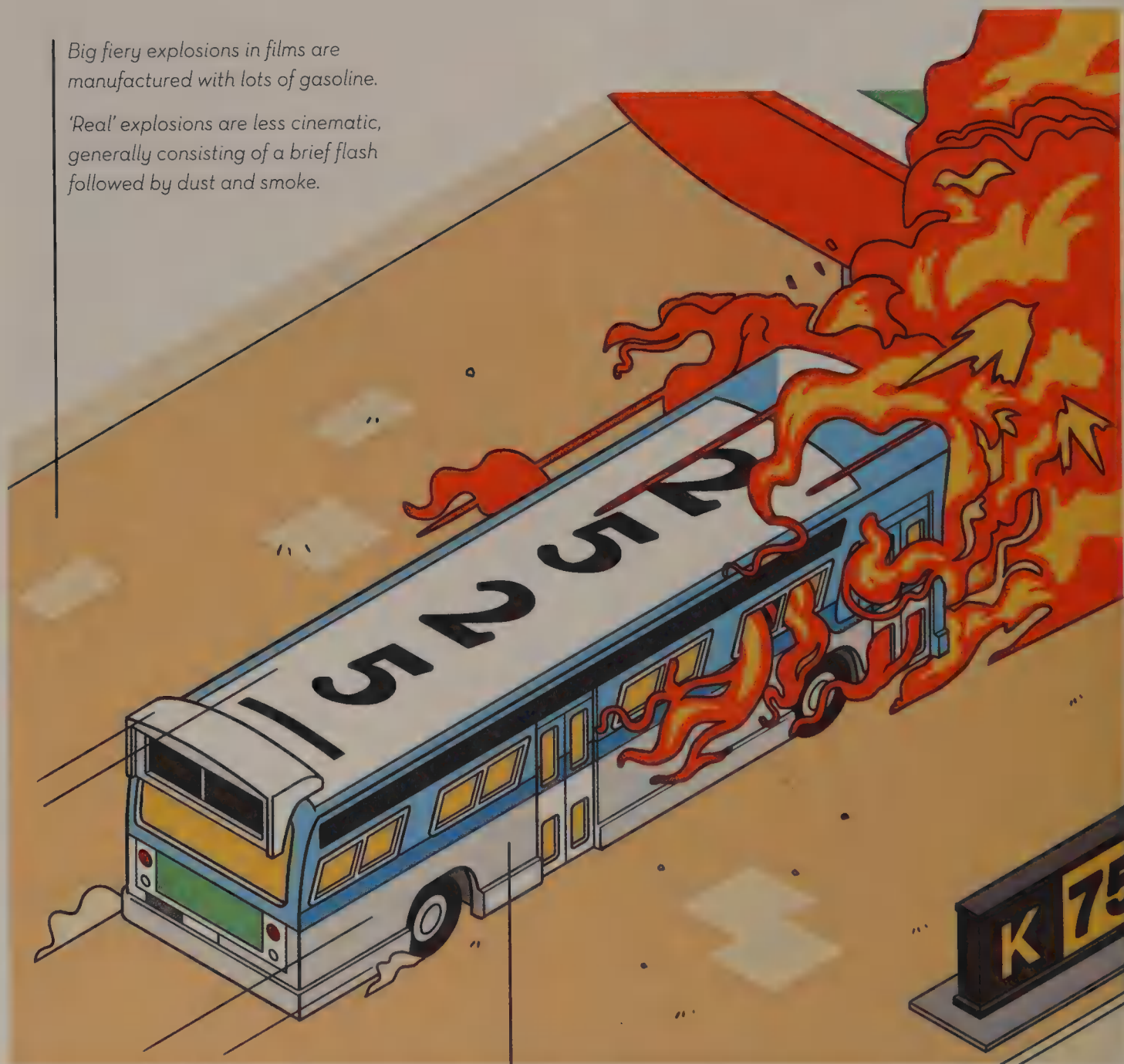
DVD (2000)

DIVERSE DISTRACTIONS

During the 1990s, the succession of increasingly impressive blockbusters escalated. Many films in this period were characterised by dramatic explosions and over-the-top set-pieces. As this mania grew, so did ticket sales, and *Titanic* (1997) became the first film to gross over a billion dollars. The price of cinema admission tickets inflated and general attendance increased as multiplexes became the norm.

Big fiery explosions in films are manufactured with lots of gasoline.

'Real' explosions are less cinematic, generally consisting of a brief flash followed by dust and smoke.



Speed (1994)

Sandra Bullock learned how to drive a bus just for her role!

Dreamy Direction

The American director, musician and actor David Lynch had a burst of productivity in the 1990s, with films such as *Wild at Heart* (1990) and *Twin Peaks: Fire Walk With Me* (1992). Lynch takes inspiration from dream logic, and with every project his works seems to become increasingly peculiar. Film critics often extract their own meaning from his films, painting them as subversions of popular culture or as surrealist art.

DAVID LYNCH



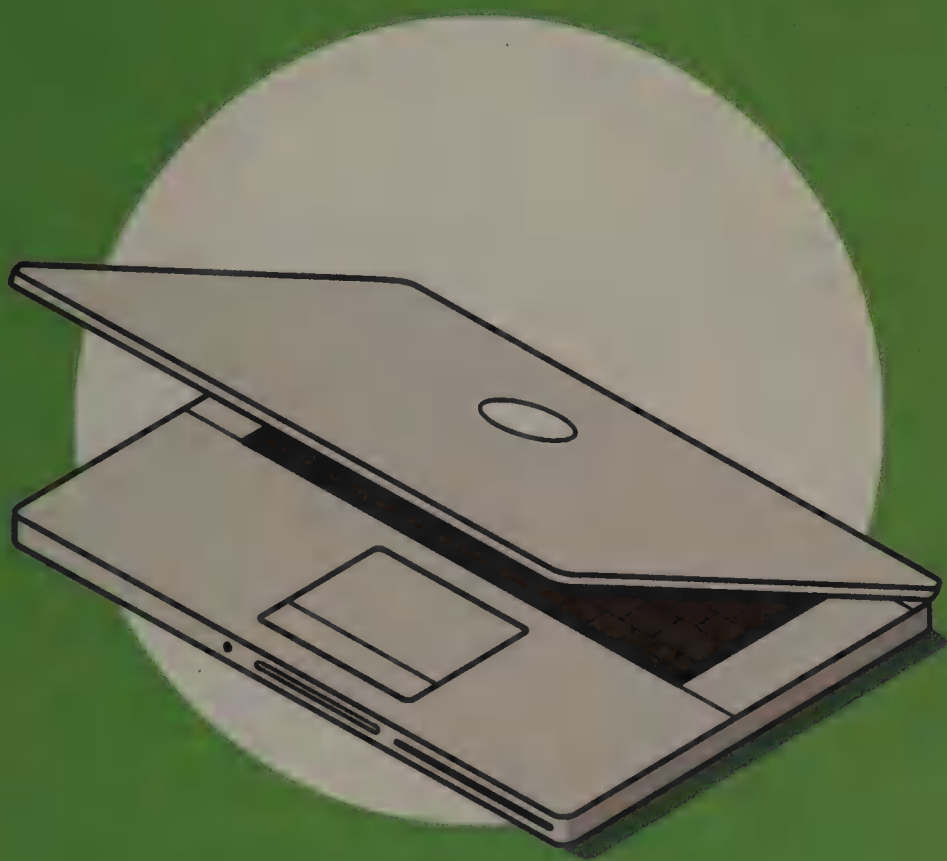
Lynch prefers informal and conversational auditions.



Protective socks to prevent tarnishing the floor polish.

The zigzag pattern previously appeared in *Eraserhead* (1977), adorning Alex's lobby.

21st CENTURY



THE 2000s

The emergence of the internet overwhelmed older media. Laptops, smartphones and tablets became more affordable and portable, allowing consumers to view content nearly anywhere. Services such as Sky Anytime and BBC iPlayer further freed viewers from the constraints of the TV timetable. Peer-to-peer formats proved harmful to the film and television industries, as some people found they could easily access content illegally on torrent and video streaming sites.

More affordable and user-friendly devices made piracy much more commonplace.

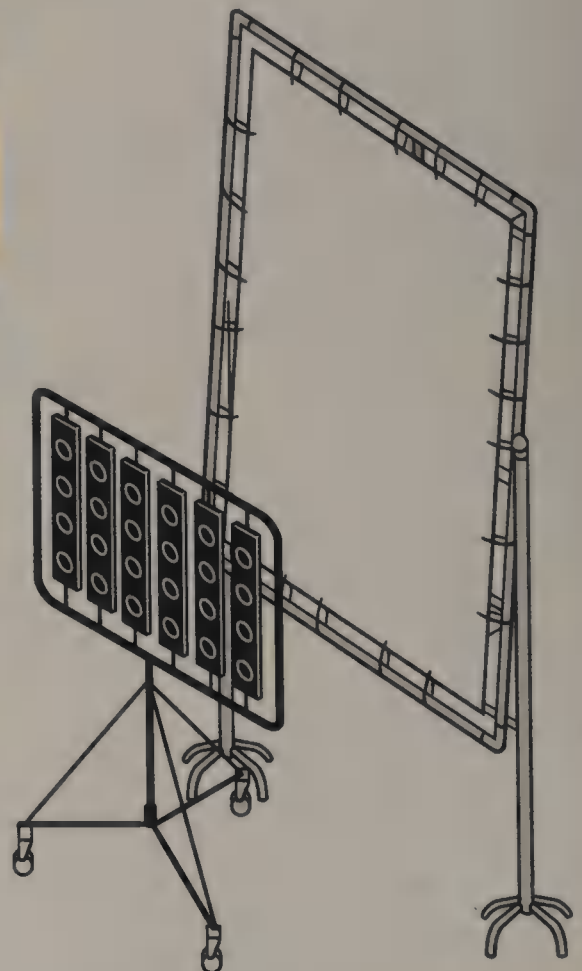


Macbook Pro (2006)

Sophisticated use of light panels and diffusers created a convincing range of artificial lighting in the studio.



Peer-to-peer file sharing.



Chroma Key

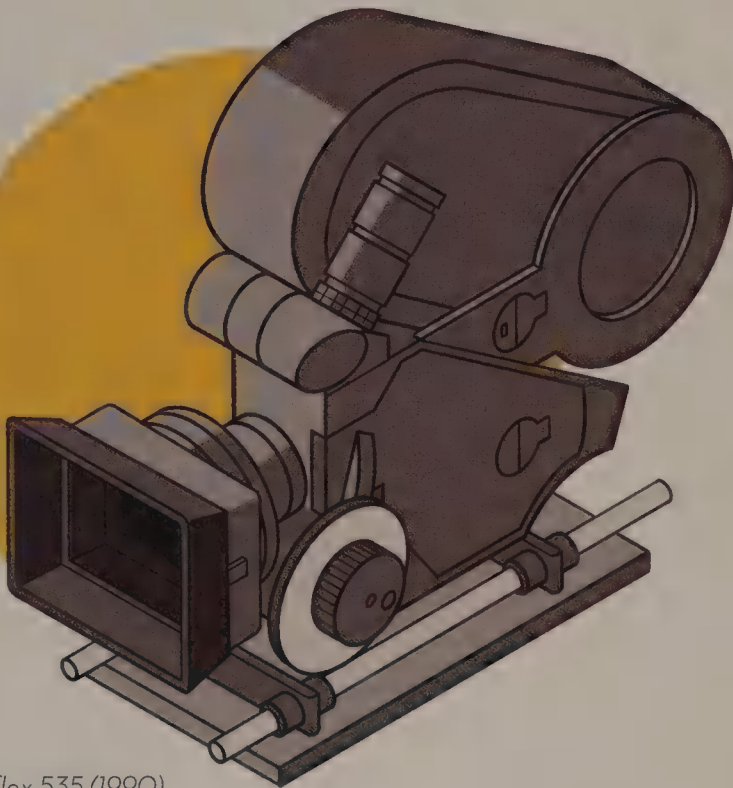
Chroma key is a post-production process that involves removing or replacing a specific range of colour from footage. Typically, it is used to combine separate pieces of footage, creating the illusion that objects and actions occupy the same space. Technological advances in the 2000s made compositing the footage far easier. First-time director Kerry Conran's *Sky Captain and the World of Tomorrow* (2004) made extensive use of this technique, and was filmed almost entirely against green screen backdrops using a Sony HDW-F900. The filming itself took a measly 24 days, while the vast majority of time, effort and cost went into CGI effects created in post-production.



A set from *Sky Captain and the World of Tomorrow* (2004).

CULTURAL EXCHANGE

Hero (2002) was a triumph of cinematography, art, design and choreography from Chinese director Zhang Yimou and Australian-born cinematographer Christopher Doyle. During pre-production, locations were chosen to communicate emotions through colours and lighting; the script was re-written according to the feelings evoked by the climate. In one instance, filming had to be delayed until the leaves of a forest turned a specific hue of yellow.



Arriflex 535 (1990)



ZHANG YIMOU



CHRISTOPHER DOYLE

Practical weather effects being used on location for Hero (2002).



The related scene; a glorious celebration of colour.



THE 2010s

Superhero, science fiction and fantasy films became very popular during this decade. Marvel Studios devised a shared cinematic universe structure, allowing various characters and stories to exist both in their own films and in productions that included ensemble casts. Other franchises would attempt to follow suit with varying degrees of success, such as *Star Wars* and the *Universal Monsters* film series.

Both blue and green screens offer their own advantages. One advantage to the highly saturated green is its rarity in clothing.



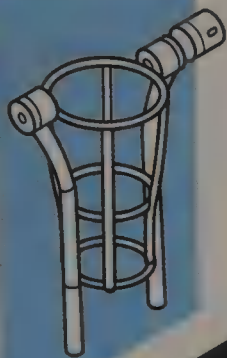
A set piece from *Avengers* (2012), constructed from a mixture of practical props and use of green screen.

Marvellous Motion Capture

Motion capture dramatically improved with the introduction of computer-aided design. After his experience of portraying Gollum for *The Lord of the Rings* series, Andy Serkis co-founded The Imaginarium in 2010, a company specialising in motion capture-aided animation.

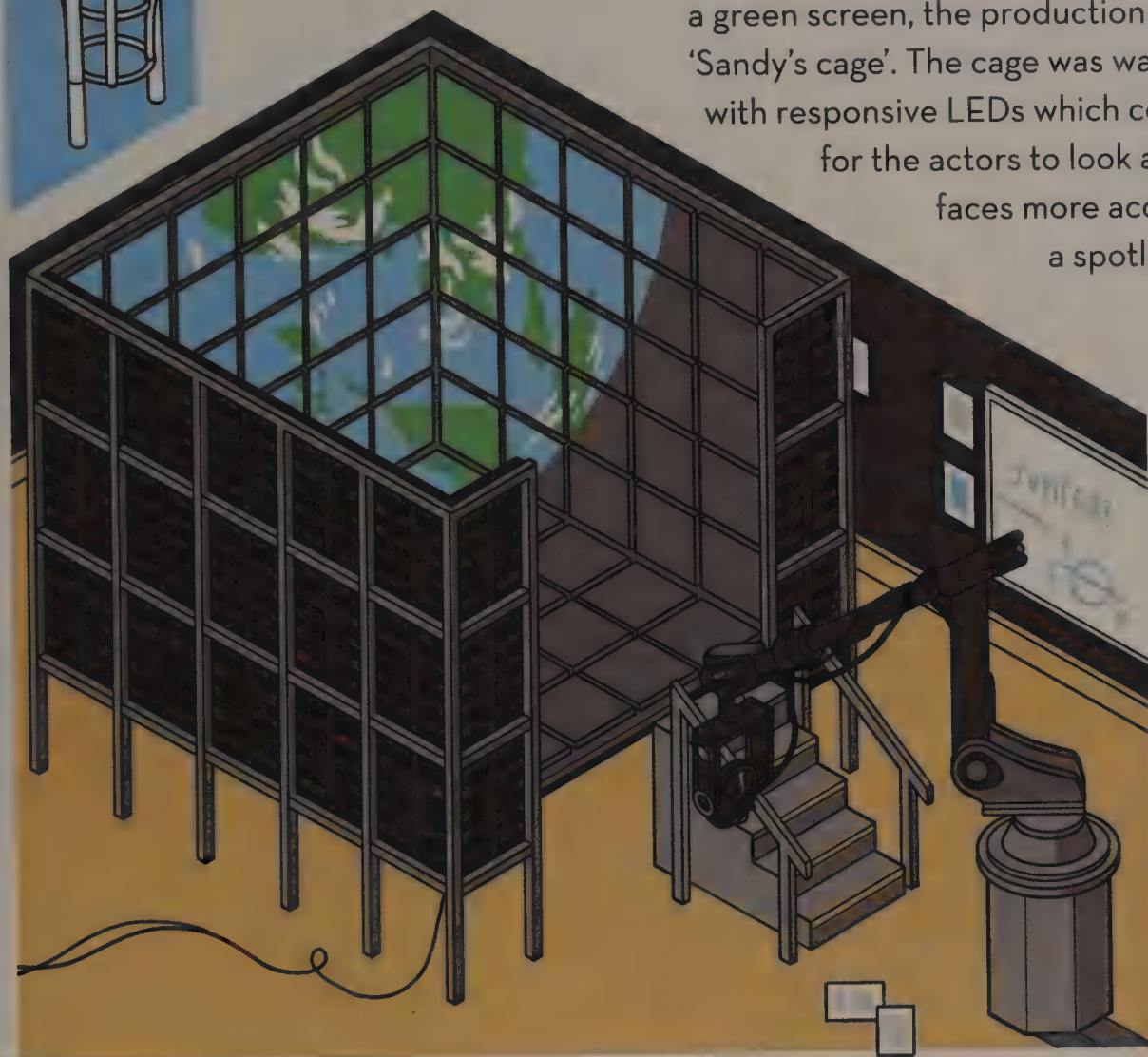


ANDY SERKIS



The contraption used to simulate the weightless movements in space.

The principle filming of the Mexican Alfonso Cuarón's *Gravity* (2013) involved a great deal of close-ups of the actors' faces. To help the actors respond to something more than a green screen, the production team built 'Sandy's cage'. The cage was walled entirely with responsive LEDs which conjured images for the actors to look at and lit their faces more accurately than a spotlight.



The LED light box creating the 360 degree imagery of high orbit.

Custom Bot & Dolly Iris robotic camera rig (2013)

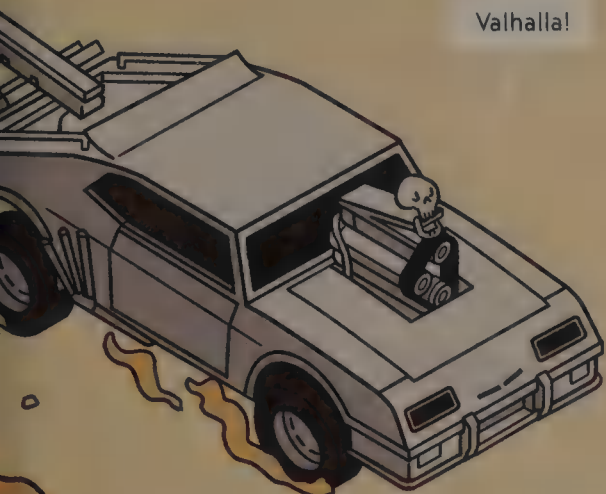


SYNTHESIS

During the 2000s, big-budget blockbusters involved more and more computer generated environments, effects and characters, an approach that began to wear on critics and audiences.

Immortan Joe!





Valhalla!

Other filmmakers returned to practical effects with CGI for enhancement, rather than relying solely upon it. *Mad Max: Fury Road* (2015), directed by the Australian George Miller, made extensive use of spectacular stunt work, pyrotechnics and on-location filming to create a visceral, standout action film.



GEORGE MILLER



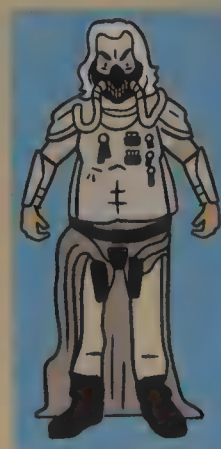
MARGARET SIXEL

Editor



JENNY BEAVAN

Costume designer



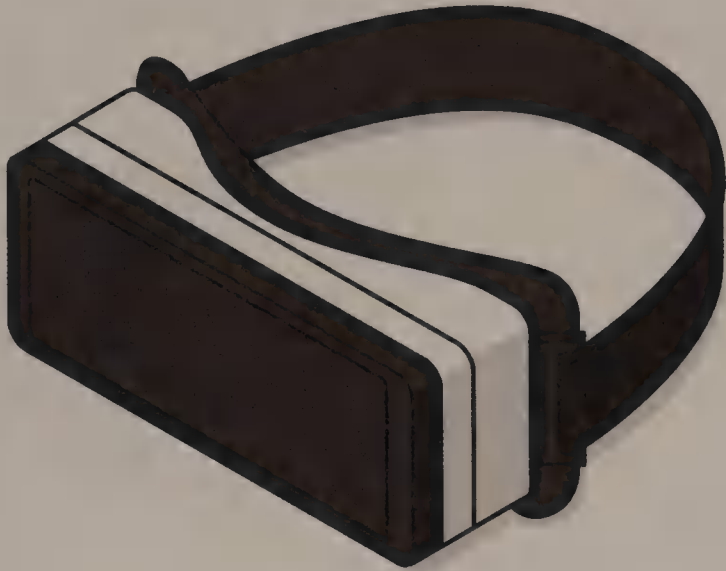
*Hugh Keays-Byrne
as Immortan Joe*



*Charlize Theron
as Furiosa*

THE FUTURE

With this sort of book, it is customary for the author to make a silly prediction about the future. I most definitely look forward to reviewing this portion of the book in a couple of decades from the comfort of my hover-chair.



A virtual reality headset. (2018)



Augmented reality 'Snap Spectacles', a precursor to a future of omnipresent filming? (2016)



VR or AR devices will likely become as commonplace as smartphones are today.



Holographic projection or AR could supersede the classic home fixture of the TV set.

New Realities

So, what's at the forefront of technology right now? Video games frequently outperform films, which I would say is a case for audiences wanting more interactive experiences. Recently, Gareth Edwards, the director of *Rogue One: A Star Wars Story* (2016) used a virtual reality (VR) headset in order to direct footage that was completely computer-generated.



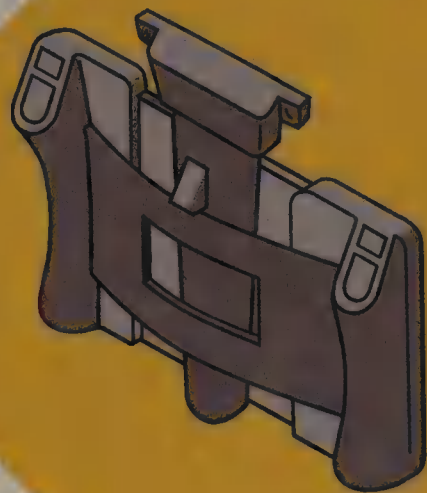
The director 'films' virtual pre-rendered action using the handset.



A vast team of animators polish the animation based on the director's input.



The handset acts as an interactive window into pre-rendered footage.



Augmented reality handset (several devices strapped together).

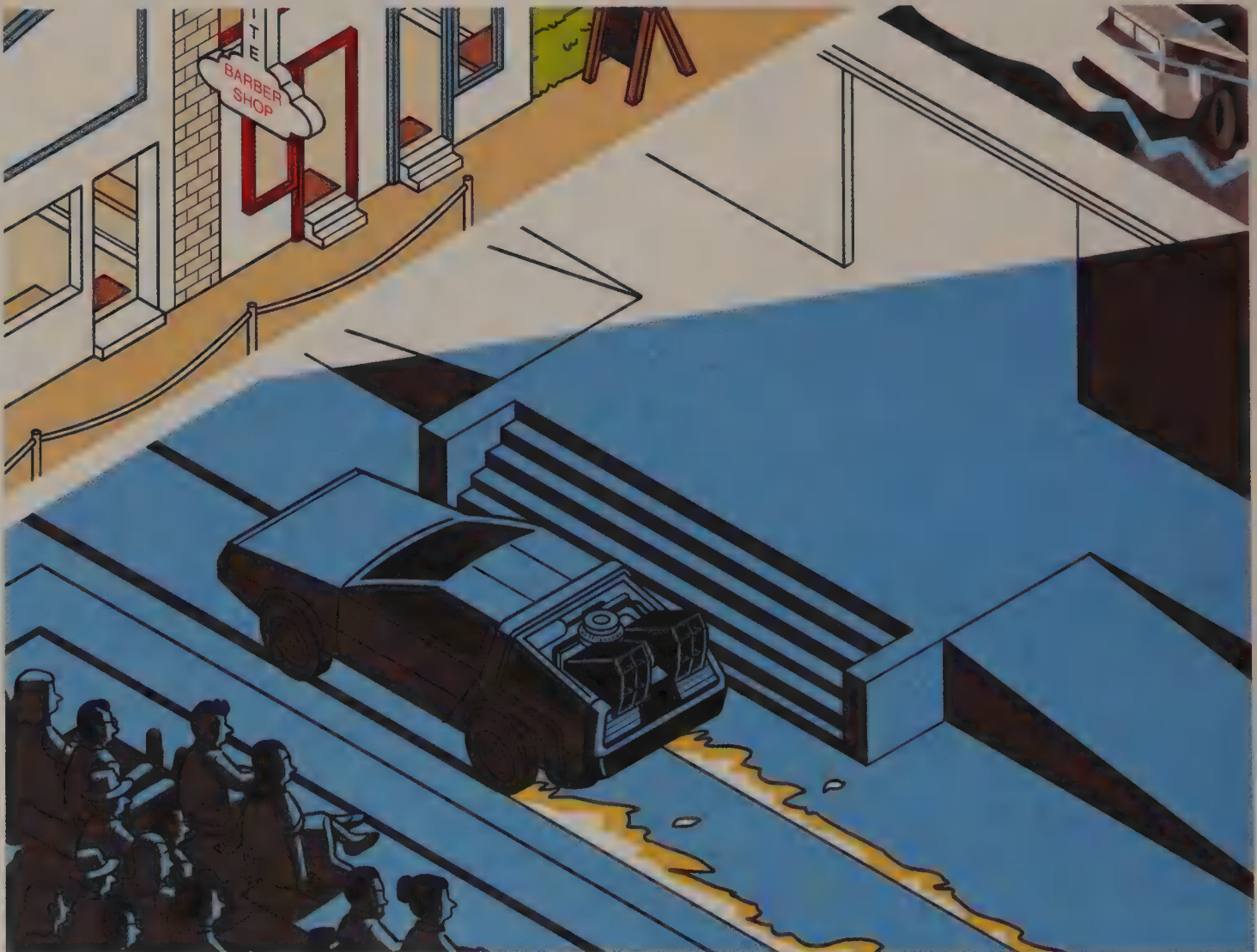
Augmented reality has existed for a good while, but it will take a few years for it to become a truly seamless experience. Perhaps decades from now, glasses or contact lenses will be able to augment the viewer's environment into a cinematic experience.

HERITAGE

As cinema attendance continues to slide, some exhibitors have offered interactive screenings such as those arranged by Secret Cinema in London. Audiences arrive dressed according to the aesthetic of the film and are entertained by the screening as well as by a host of actors, set pieces and other interactive elements. This experience is remarkably similar to that of vaudeville houses. Many of the very first cinemas from the 1910s are still in operation and have become much-loved heritage centres for communities, often showing a range of classic and cult films.



A thrilling scene in Back to the Future (1985), projected and recreated for a live audience simultaneously.



A 'Secret Cinema' screening: a fantastic gimmick or a return to vaudeville?



Small productions streamlined by accessible tech.



Easier distribution via streaming services.



Solitary kinetoscope.



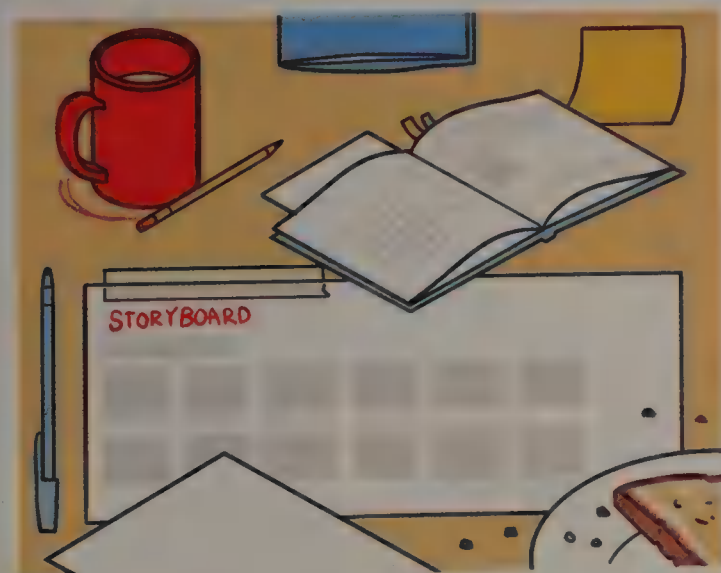
Cinema crowd experience.



Shared home media.

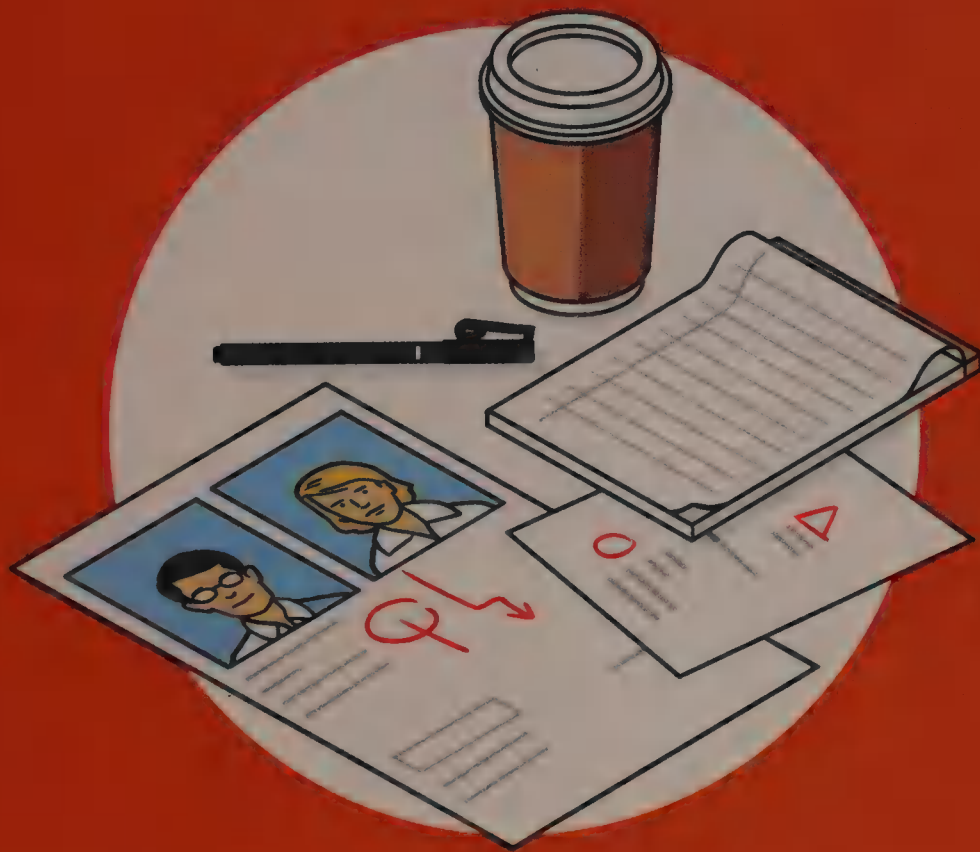


Solitary VR experience.



The context in which we view film will change. The intimacy of Edison's Kinetoscope was replaced by the shared experience of the cinema, while today the appealing comfort and convenience of home media has reduced cinema attendance. One constant in the chaotic journey of filmmaking is the pioneering spirit of technological investigation; we will always explore new ways to share our stories.

MEET THE TEAM





Stuntman

Graphic Designer

Sound Editor

Key Hair

Special Effects Supervisor

Stunt Coordinator

Construction Coordinator

Negative Cutter

Weapons Master

Prop Maker

Head Carpenter

Film Editor

Illustrator

Costume Designer

Director

Writer

Line Producer

Unit Publicist

Second Unit Director

Producer

Production Manager

Visual Effect Director



Set Dresser

Composer

Best Boy

Sound Designer

Re-recording mixer

Art Director

Rotoscope Artist

Key Grip

Greensman

Set Designer

Set Decorator

Production Designer

Foley Artist

Gaffer

Visual Effects Producer

Location Manager

Director of Photography

Boom Operator

Location Scout

Casting Director

Camera Operator

DIRECTION

Director

Overseer of the creative aspects of filmmaking. A director influences nearly all aspects of production, including how an actor performs and technical aspects such as how scenes are shot.

Second Unit Director

Overseer of secondary footage, for example insert shots and special stunt sequences.

Writer

The person responsible for writing the script.

PRODUCTION

Producer

Responsible for funding the film, hiring crew members and is sometimes involved in creative decisions with the director.

Line Producer

A liaison between producers, studios and other departments; the line producer also has a main role in managing budget.

Production Manager

Supervises the logistics of filmmaking, which may include budget and time-keeping.

Unit Publicist

Liaises between the production team and the press.

LOCATIONS

Location Manager

Oversees how locations are used.

Location Scout

Responsible for researching and locating places to film.

CASTING

Casting Director

Chooses actors suitable to play in the film.

CAMERAS, LIGHTING AND OTHER RIGGING

Director of Photography / Cinematographer

Chief of camera crew. Works with the director to decide on the use of cameras, stock and how shots are composed.

Camera Operator

A person who handles the camera on set.

Boom Operator

A person who handles microphones on set. Microphones are often attached to a telescoping pole, known as a 'boom pole'.

Gaffer

The head electrician in film production.

Key Grip

Supervisor of all rigging, lighting, camera movement and camera cranes. Works closely with the director of photography.

Best Boy/Girl

An assistant to the gaffer and key grip.

PRODUCTION DESIGN / ART DEPARTMENT

Production Designer

Responsible for the aesthetics of a film, including the sets and costumes.

Art Director

Reports to the production designer. Has a more hands-on approach to working with artists to make the creative vision possible.

Set Designer

A draughtsman who designs practical sets for use in the film.

Set Decorator

Responsible for furnishing and other props used on sets.

Set Dresser

A person who installs and removes furnishings and props.

Greensman

A person who installs both natural and artificial plants for sets and landscapes.

Illustrator

Draws representations of how things could look.

Graphic Designer

Responsible for the graphic elements used in the film, including type, image and some props.

Construction Coordinator

Responsible for the building of sets.

Head Carpenter

Leads a group of carpenters and builders who create furniture and furnishings.

Prop Maker

Creates unique props that are used in the film.

Key Scenic

Leads a group responsible for treating the set, for example making the environment seem older by artificially ageing it.

Weapons Master

Manages the use of guns, blades and other combat tools.

COSTUMES, HAIR AND MAKE-UP

Costume Designer

Responsible for the clothes actors wear.

Key Make-Up Artist

Head of the make-up department, plans and designs the make-up worn by actors, including prosthetics.

Key Hair

Head of the hairdressing department, in charge of styling the hair of actors.

SPECIAL EFFECTS

Special Effects Supervisor

Responsible for practical effects on set, such as explosions.

Stunt Coordinator

In charge of the stunt work on set.

Stuntman / Stuntwoman

Performs dangerous and highly skilled feats.

POST PRODUCTION

Film Editor

Assembles the shots to create the film, works closely with the director.

Negative Cutter

Cuts and splices film negative before it is exposed in the lab.

Colourist

Manipulates the colouration of films by chemical or digital means.

Visual Effects Producer

Leads a department to break down a script into storyboards and figure out what requires visual effects such as miniatures or CGI.

Visual Effects Director

Responsible for the visual effects aesthetics of a film, including CGI.

Rotoscope Artist

Manually remove or add effects. They may be used to hide stunt wires and rigging.

Matte Painter

Creates paintings to extend or modify an image.

SOUND

Sound Designer

In charge of how sound is applied to a film.

Sound Editor

Applies sound to footage.

Re-recording Mixer

Balances the different sounds together.

Composer

Writes the musical score to a film.

Sometimes leads the orchestra during recording sessions as a conductor.

Foley Artist

Creates sound effects along to footage.

This often includes footsteps and the sound of objects being handled.

ACTORS

Actor / Actress

A person who performs in a film.

Extra

An actor who plays a minor role, often in the background.

GLOSSARY

Anamorphic Lens

A lens that compresses a wider field of view into a narrower image, so circles appear to be oval. Requires another lens to 'desqueeze' the image.

Blimp

A housing built around old cameras to reduce the amount of noise they made.

Cut

A change in the camera position or angle.

Dolly

A small trolley usually fixed to tracks, allowing large cameras to move smoothly.

Film (verb)

To record a scene.

Film (noun)

A strip of material coated in light-sensitive emulsion, used to create sequential images.

Also a common synonym for motion picture.

Frame

A single image, part of a sequence of motion pictures.

Montage

Rapid cutting of footage to convey narrative or emotion.

Motion Picture

The broadest term applied to imagery that moves, including films and animation.

Shot/s

A portion of motion footage.

Stock

The format of the film used to record scenes, for example 35mm or 70mm.

Mise en Scène

The aesthetic consideration of everything on a set.

Titles

Words that appear on screen.

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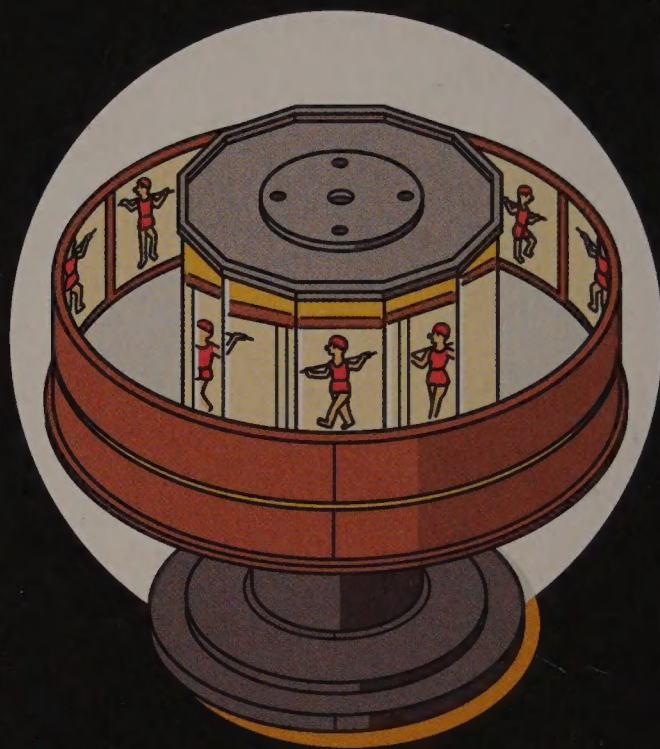
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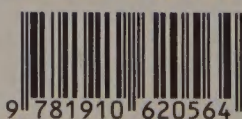
Before there were cameras, before there were sets,
before there was Hollywood... there was light.



The history of filmmaking is one of great technical innovation and artistry. Investigate everything from set design to costumes to the development of the camera itself, in this immersive guide featuring exquisite illustration by Adam Allsuch Boardman.



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